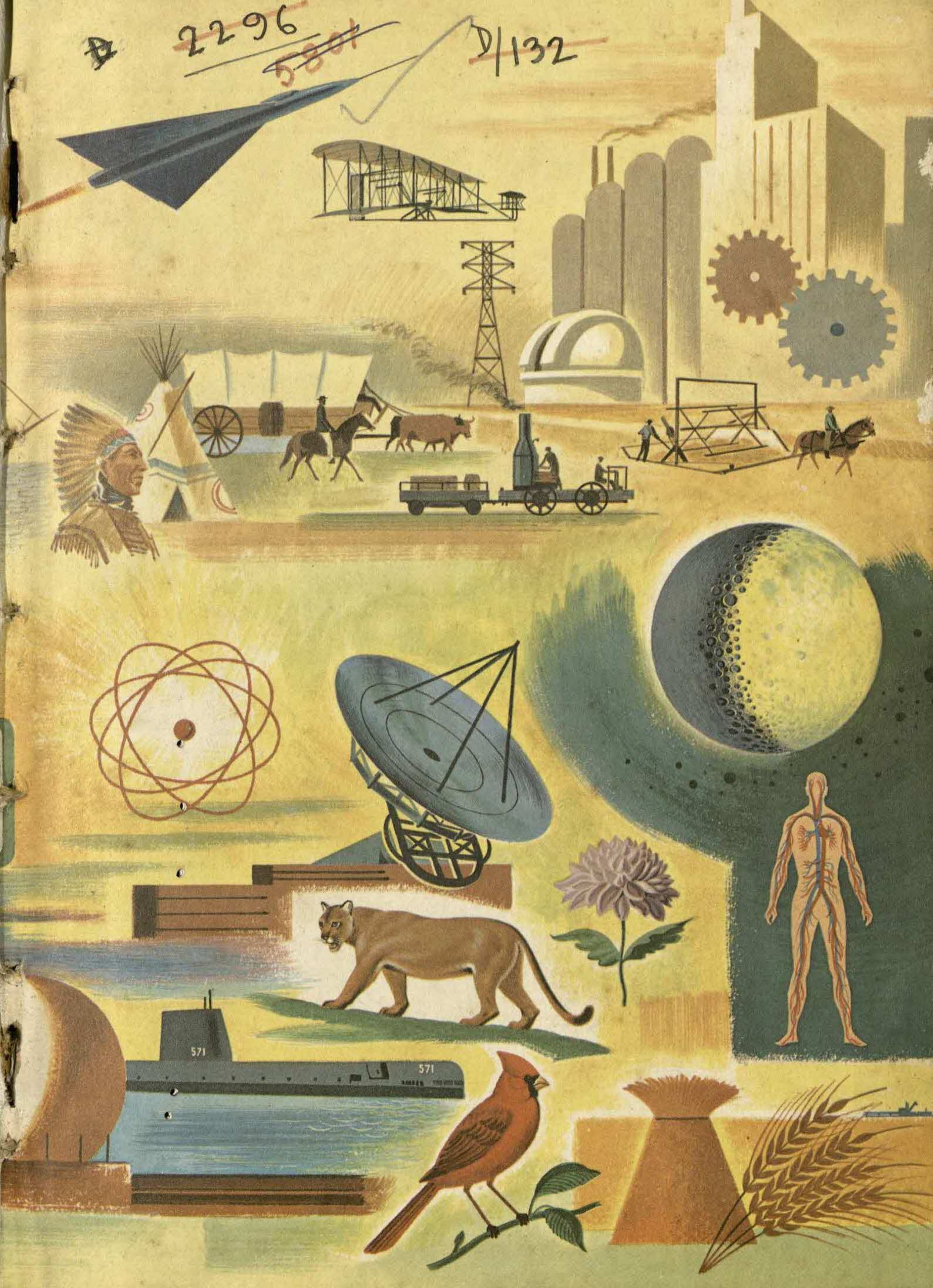
THE WONDERLAND OF KNOWLEDGE

[illegible] PAGEANT

E=mc²
EINSTEIN

B 2296 ~~5801~~ D/132



225
D/132
TRAINING COLLEGE. HAMIRPUR.

THE WONDERLAND OF KNOWLEDGE

The Pictorial Encyclopedia

1961

Editor in Chief—EVERETTE EDGAR SENTMAN
B.S., University of Illinois; Drake U., Loyola U., American Conservatory
Writer, Lecturer; Author, "The Encyclopedia—A Key to Effective Learning and Teaching"

Former Editors in Chief—GORDON J. LAING
Ph.D., LL.D., Litt.D.
Former Dean, Division of Humanities, University of Chicago

HARRY ORRIN GILLET
B.S., University of Chicago
Former Supervisor of Education, Museum of Science and Industry, Chicago
Principal Emeritus of the University of Chicago Laboratory School

Managing Editor—ASHER J. BIRNBAUM
Ph.B., University of Chicago; B.A., Northwestern U.

Associate Editors—RODERICK M. GRANT
A.B., Beloit College
Managing Editor, *Popular Mechanics*

VALETA WISURI
A.B., LL.B., Washington University

Science Editor—ELIZABETH R. JOHNSON
B.S., St. Ambrose College; Former Control Laboratory Analyst, Abbott Laboratories;
Patent Abstracter, Internatl. Minerals and Chemical Corp.

Art Director—RICHARD K. GORSKI
M.S., University of Wisconsin
Art Education Specialist

Picture Editors—JAMES POYNTON
Ph.B., Loyola University

RALPH W. MILLER
Ph.B., University of Chicago; Formerly of International News Photos

Production Manager—CROSBY J. LISKE
Graduate, Art Institute of Chicago

Director of Educational Research and Services—VICTORIA S. JOHNSON
Special Studies, Northwestern University, American Conservatory
Assistant Director, The Chicago Tribune Miracle of Books

WONDERLAND OF KNOWLEDGE CORPORATION

THE BOARD OF EDUCATORS

This distinguished advisory body enriches The Wonderland with sound educational techniques, important facts, and significant meanings.

SELMER H. BERG, M.A.
Superintendent of Schools
Oakland, California

KARL BERNHARDT, Ph.D.
Professor of Psychology and
Assistant Director, Institute for Child Study,
University of Toronto

A. J. BRUMBAUGH, Ph.D., LL.D., L.H.D.
Consultant for Research, Southern Regional
Education Board, Atlanta; *Formerly Dean,*
University of Chicago; Director, Programs
Branch, U. S. Office of Education

FRANCIS KEPPEL, B.A.
Dean of Graduate School of Education
Harvard University

E. T. McSWAIN, Ed.D.
Dean and Professor of Education
School of Education
Northwestern University

WILLIAM VAN TIL, Ph.D.
Chairman of Department of
Secondary Education, Professor of
Education, New York University

Chairman
CAREY CRONEIS, D.Sc., Ph.D., D.Eng.
Provost of William Marsh Rice University,
Houston, Texas;
Formerly President, Beloit College

~~8036~~
6336

PRONUNCIATION

The pronunciation of titles is indicated by accenting the word or by respelling it phonetically in italics. In the phonetic spelling, letters are used to indicate the sounds which they most commonly represent.

A vowel is *short* when followed by a consonant in the same syllable, unless the syllable ends in silent *e*.

A vowel is *long* when the letter occurs in a syllable which ends in silent *e* or when ending an accented syllable.

The hard sound of *c* is represented by *k*.

The hard sound of *s* is represented by *z*.

The foreign sounds which have no equivalent in the English language are represented as follows:

N for the French *n*, as in Breton: (**Breton,** *bre toN'*).

ö for the German *ö*, as in Göttingen: (**Göttingen,** *gö' ting en*).

ü for the German *ü*, as in Blücher: (**Blücher,** *blük'ur*).

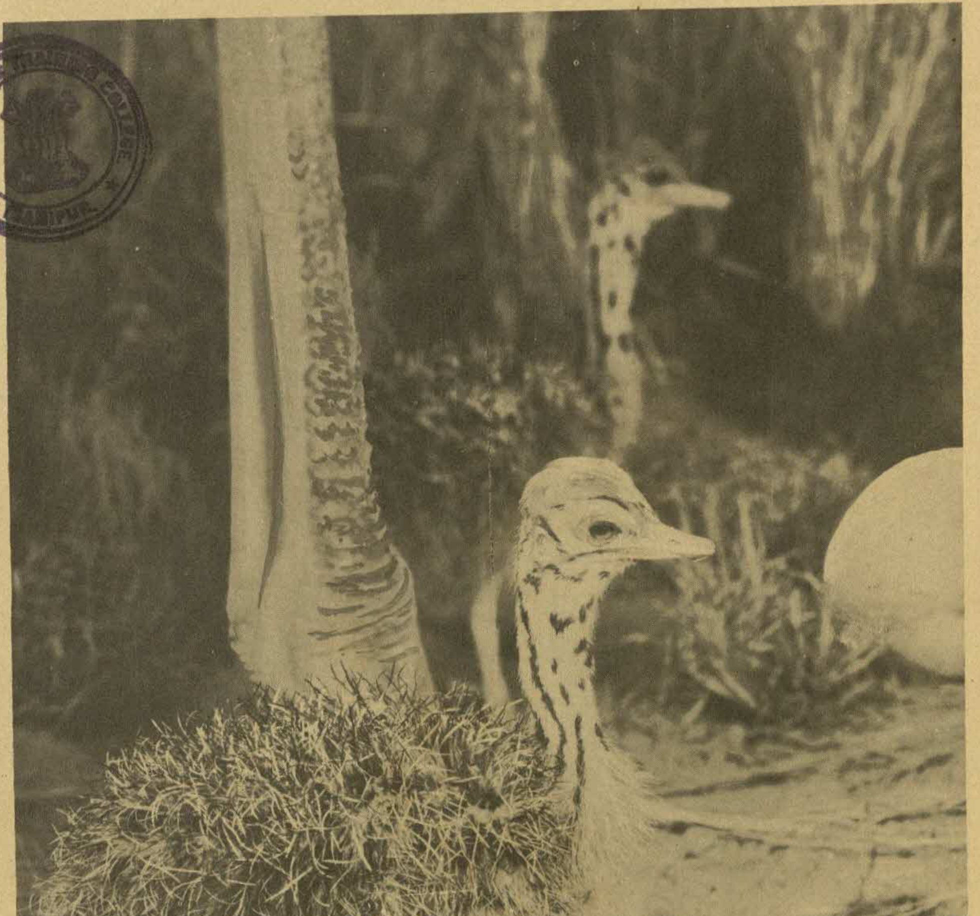
Copyright© 1937, 1940, 1942, 1944, 1945, 1946, 1949, 1950, 1951,
1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961

PUBLISHERS PRODUCTIONS, INC.
Tangley Oaks Educational Center
Lake Bluff, Illinois

Printed in the United States of America

Library of Congress Catalog Card Number: 61-5907

~~22~~
SENIOR BASIC TRAINING COLLEGE * IMPHAL



A Wonderland PICTURE STORY
Volume IX

American Museum of Natural History

OSTRICH. About the size of a hen when it was hatched, this young ostrich will in six months reach its full height of seven or eight feet, if it gets enough to eat. See page 2644.

Looking over Volume IX . . . .

What are the "big brother" and "dollar diplomacy" interpretations of the Monroe Doctrine?

The United States likes to feel that its interest in the welfare of smaller American countries is similar to the protective attitude of a big brother. However, many of these smaller countries believe that their "big brother's" chief interest is in exploiting them commercially and protecting merely the "dollars" already invested. See MONROE DOCTRINE.

How did a French philosopher contribute to the formation of the most successful democratic government in the world?

The framers of the United States Constitution accepted as the basis of the new government an idea by the Frenchman Charles Montesquieu, calling for the division of government into the executive, legislative, and judicial branches. See MONTESQUIEU, CHARLES.

How is the "sound" in talking pictures made to synchronize with the movements on the screen?

Because a beam of light is being affected by the sound waves, the sound is actually photographed on a strip of film at the same time that the camera is recording the action. Together, the two films are then developed and printed. As the picture is being shown, electric currents convert the light waves from the sound film back into sound waves, which are broadcast through speakers behind the screen. See MOVING PICTURES.

What existing international organization was conceived by an American President but rejected by his people?

The League of Nations was the dream of President Woodrow Wilson, but the Senate of the United States voted down his appeal to ratify the League's Covenant. See NATIONS, LEAGUE OF.

What feature of the Nebraska state government is not shared by any other state of the Union?

Nebraska has a unicameral, or single-house, legislature. All of the other states have two houses, corresponding to the national Senate and House of Representatives. See NEBRASKA.

Why did the ancient Egyptians believe the Nile River to be a kind god, even though it overflowed its banks each spring?

They knew that if the river did not rise, they would be unable to raise enough crops to live. See NILE.

In what way has Mother Nature favored North America?

She has spread her natural wealth over our continent so lavishly that it is possible for the people to attain a high state of development independent of the rest of the world. See NORTH AMERICA.

What is the historical mystery of North Carolina?

Soon after Sir Walter Raleigh's second band of colonists had settled at Roanoke, an island off North Carolina, the colony's governor returned to England for more provisions. When he came back to Roanoke, the settlement had completely disappeared, leaving no trace except the word *Croatan* carved on a tree. The mystery has never been solved. See NORTH CAROLINA.

Where in the Libyan Desert in Africa is an acre of land worth as much as $5,000?

The Kufra oasis, in the heart of the desert, is one of the most fertile spots in the world. Five cities with thousands of inhabitants are located in this huge oasis, and the land contains over one and one-half million trees. See OASIS.

What world-famous musician was also a great statesman?

Ignace Paderewski, one of the greatest pianists of all time, also served as Premier and Foreign Minister of his native country, Poland. See PADEREWSKI, IGNACE JAN.

What causes us to cough?

A portion of the soft palate lining the roof of the mouth hangs downward almost to the tongue. This is called the *uvula.* When the uvula is too relaxed, or becomes enlarged, it tickles our throat. Our cough is an attempt to relieve this tickling. See PALATE.

Where in America must one go east to get from the Atlantic Ocean to the Pacific?

The Isthmus of Panama is twisted in such a way that the Pacific end of the Panama Canal is farther east than the Atlantic end. See PANAMA CANAL.

SENIOR BASIC TRAINING COLLEGE BANIPUR

FAVORED FUR
The mink is a member of the weasel family. It has a vicious bite and may even eat its young when excited. But the world over, its shiny soft fur is a favorite for scarves, stoles, and trimmings. The natural color is a shade of brown; the mutation colors include white, blue, and platinum.

MINK. This animal is probably the most resourceful hunter of the weasel family. Minks are equally at home searching for a mouse among the leaves, chasing a hare over the upland, or pursuing muskrats or fish under water. They appear to give little heed to day and night, being ready to take a nap whenever the appetite is satisfied, but ready to resume hunting activities as soon as they are awake. They are long and slender of body, but short of limb. Because of this fact they are slow and awkward in gait as they amble along, but can make remarkable speed when running, as they take long bounds, arching the back at each leap.

The pelts of minks are highly prized for use in the manufacture of fur garments. The natural color varies from light shades of brown to a rich, glossy, dark brown. Today, most pelts come from mink farms, and breeders on these farms, or ranches, have produced a wide variety of colors, including white, blue, and silver.

In America, minks are widely distributed from far-northern Canada to areas bordering on the Gulf of Mexico. However, they do not occur in arid portions of the Southwest.

MINNEAPOLIS, *min e ap'o lis,* MINN. Situated on the Mississippi River at the head of navigation is Minneapolis, famous as one of the world's great flour-manufacturing centers. It is on the eastern edge of the great wheat-producing region of the Northwest, for which it serves as the chief market and distribution point. The city extends for ten miles along both sides of the Mississippi, and covers an area of fifty-eight square miles. Twenty bridges cross the river within the city limits. Adjoining Minneapolis on the east is St. Paul, capital of the state.

Trade and Industry. The trading territory of Minneapolis includes all the surrounding states, as well as parts of Canada. The city is the leading railroad center for the Northwest. Its commerce has increased greatly within recent years with the revival of traffic on the upper Mississippi River.

At one time Minneapolis was a lumber center, but the lumberyards were replaced by the flour mills, which can produce more than 50,000 barrels of flour a day. The manufacture of linseed oil and oil cakes, electronic control equipment, farm machinery, furniture, clothing, chemicals, and metal products, food processing, railway-car repair, and printing are also important. Rail, air, truck, bus and barge lines provide fine transportation facilities.

General Description. With few exceptions, the streets of Minneapolis run at right angles. Hennepin Avenue is one of the leading thoroughfares; along Nicollet Avenue is the shopping district; Marquette Avenue is the financial street. The city has many modern public and business buildings, the tallest of which is the thirty-two story Foshay Tower. In addition to the public-school system, there are a number of colleges and professional schools, including the University of Minnesota.

Minneapolis has one of the most beautiful systems of city parks in the United States. In the heart of the residential section, surrounded by parks and boulevards, there are several lakes, the largest of which is Lake Calhoun. Particularly outstanding is Minnehaha Park, in which Minnehaha Falls are located. A fine system of boulevards, called the "Grand Rounds," encircles the city and connects the lakes and parks.

History. Although several French traders are thought to have visited the region at an earlier time, Father Hennepin is credited with the discovery of the Falls of Saint Anthony in 1680. Zebulon Pike made a treaty with the Indians about 1805 and purchased from them a tract of land for a military reservation, on which Fort Snelling was erected in 1819. In 1845 the village of Saint Anthony was founded, and ten years later Minneapolis was established on the opposite bank of the river. The early rivalry of the two ended with their union in 1872. Minneapolis now has a population of about 486,000. With its "twin city" of Saint Paul and their suburbs, Minneapolis forms a metropolitan area of nearly a million residents.

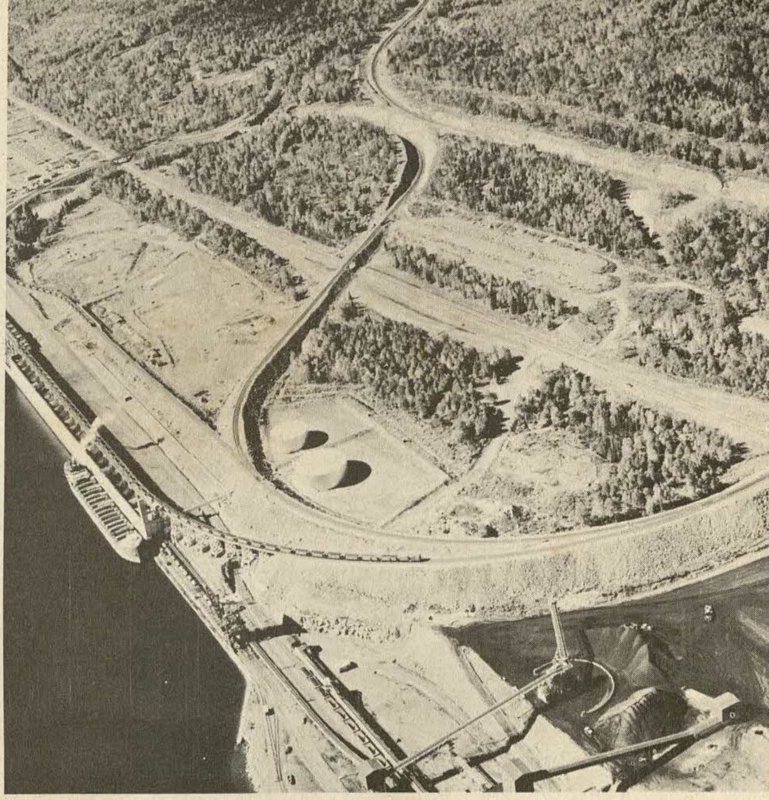
MINNEHAHA. As the heroine of Longfellow's poem, *Hiawatha,* Minnehaha is described as a beautiful Indian maiden. She was the daughter of an old arrow maker, and her name means *laughing water.* A waterfall in Minnesota has been named Minnehaha.

MIN'NESINGERS. The bands of wandering minstrel singers who traveled about Germany in the twelfth and thirteenth centuries were the minnesingers. The words and music for their songs were written by the singers and were mostly about love, but some included historical, political, and religious events. A famous minnesinger was Wolfram von Eschenbach, who wrote *Parzival.*

OVERLOOKING SAINT PAUL
Minnesota State Capitol on the heights.

MINNESO'TA. Occupying nearly the exact geographical center of North America, Minnesota, "the North Star State," is bounded on the north by the Canadian provinces of Manitoba and Ontario, and by a chain of lakes and rivers. It is truly a "land of sky-blue water," for within its borders are thousands of clear, blue lakes. In fact, its water area accounts for over 4,000 of the 84,068 square miles this "Land of 10,000 Lakes" covers. Its large production of hard spring wheat and its extensive dairy industry have earned it the nickname "Bread and Butter State." It is also called "Gopher State." In addition to its fertile soil, Minnesota has some of the world's greatest iron deposits.

Minnesota & Ontario Paper Co.



Link-Belt Company

BOOKS AND BRIDGES ARE BORN HERE

Left, four tons of logs are deftly guided into place atop a huge pulpwood pile destined for the paper mill. Right, four 96-car trains daily roll over the bins and dump their iron ore pellets at a dock installation on Lake Superior. Two ore boats can load at one time.

The Land and Its Features. Minnesota has no high mountains. Its outstanding surface feature is the height of land on its northern edge, gently sloping to the glaciated area to the south which makes up the greatest portion of the state. The high, rocky land in the far north is covered with forests. The great Iron Ranges of Minnesota are situated in this height of land. The rest of the land is rolling plain, except in the southeast, where high bluffs face the riverbanks.

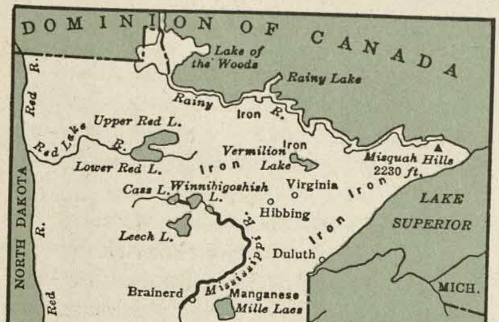
There are several important rivers in Minnesota, dividing the state into three main drainage systems. The Red River of the North drains the northwestern portion of the state. The streams north of the height of land flow into the Rainy River and the chain of lakes on the northern border, this chain connecting with Hudson Bay by way of Lake Winnipeg and the Nelson River. The southern two thirds of the state is drained by the Mississippi and its tributaries, chief of which is the Minnesota. The Mississippi, which rises in Lake Itasca in north-central Minnesota, is the most important navigable river.

Lake Superior borders the state, and part of the Lake of the Woods lies within it. The largest lakes wholly within the state are Red and Leech lakes and Mille Lacs. The innumerable small lakes are laid in a beautiful natural setting and their clear, sparkling waters abound in fish. Most of the lakes are popular summer resorts, one of the most famous being Lake Minnetonka, just outside Minneapolis. The numerous small rivers of the state, with their falls, provide water power. The Falls of Saint Anthony, in the Mississippi, at one time furnished much of the power used in the "Twin Cities" of Saint Paul and Minneapolis.

Climate. The winters in Minnesota are cold, with extremely low temperatures for short periods. The summers are moderate, with an average temperature of 72°F.; the occasional short periods of very hot weather are modified by cool winds. The greatest amount of rain falls in the summer, and the rainfall is heaviest in the eastern portion. The average rainfall is about twenty-five inches.

Natural Resources. Iron ore is the chief mineral found in Minnesota. More than sixty per cent of the iron ore mined in the United States comes from the Mesabi, Vermilion, and Cuyuna ranges in Northern Minnesota. Railroads carry the ore to Duluth and Two Harbors, where it is loaded into great freight boats and shipped to various Great Lakes points for smelting.

The mining of clay and the quarrying of limestone is an important industry, and it supplies raw material for brick, tile, and cement manufactures. Large quantities of building stone are quarried, including sandstone and red quartzite. Granite is found in great quantities throughout the state. The only large deposit of pipestone in the United States is in Minnesota.



LAND OF "SKY-TINTED WATER"
Minnesota is gemmed with well-stocked lakes.

About one half the land area of the state was originally covered with timber, chiefly white, Norway, and jack pine and spruce, balsam, and poplar. Although wasteful logging methods and forest fires depleted the timber supply, modern methods of forestry have done much to conserve and rebuild the forest lands, and pulpwood and other forest products are a valuable resource.

Agriculture. Minnesota might almost be called the "breadbasket" of the nation, for here are produced enormous quantities of wheat. Minnesota is also one of the leading states in the production of oats, flax, and corn. In the vicinity of the "Twin Cities" there are large truck farms which raise vegetables for sale in the cities. Other important crops are hay, soybeans, and potatoes. Dairying is the most important livestock industry in the state, although sheep, hogs, and beef cattle are raised in large numbers. Fruit raising is not carried on extensively and is confined to the region around Minneapolis, and to the southeastern section.

EVERY ICY STREAM A CHALLENGE
For the fisherman, Minnesota has few equals.

Manufacturing. In spite of the fact that Minnesota is chiefly concerned with agriculture, manufactures are well developed because of abundant power, raw materials, good transportation facilities, and an excellent labor force. The industries depend largely on agriculture, and the

Minnesota Division of Publicity

LIQUID ASSETS
Minnesota—the Land of Ten Thousand Lakes and the source of the Mississippi River—finds wealth in its waters. The capital, Saint Paul, located at the head of navigation of the river, is a bustling industrial city. And each year hundreds of thousands of visitors flock to Minnesota's sky-blue lakes and excellent accommodations for swimming, boating, and fishing.

Riehle Studios, Saint Paul, Minn.

Minneapolis flour mills are among the world's greatest. The manufacture of wood products is important, and the paper mills supply a thriving printing and publishing industry. Meat packing has been highly developed in connection with the livestock market in Saint Paul. Another enterprise is the manufacture of linseed oil from flaxseed. Other manufactures include machine-shop products, butter, cheese, and canned goods.

Transportation and Trade. Major water transportation facilities are Lake Superior and the Mississippi River. Duluth, on Lake Superior, is one of the leading ports in the country, because of the enormous amounts of iron ore shipped from there. The "Twin Cities" mark the head of navigation on the Mississippi River, and much freight is shipped from here by barge to New Orleans. Several transcontinental railroads cross the state, giving most of the area ready access to markets. There are more than 9,000 miles of railways.

The greatest primary grain markets in the world are located in Minneapolis, Duluth, and Saint Paul. They serve as distributing centers for the entire northwestern section of the United States. The leading articles of export of Minnesota are wheat, flour, and iron ore. Lumber is also important, most of it being shipped by water from the Lake Superior ports to Eastern markets. Coal and manufactured goods are the chief imports.

The People. Although the population of Minnesota is for the most part evenly distributed, there are large areas in the north that are sparsely settled. The population is about 3,427,000. A large part of the state's population is of foreign birth—

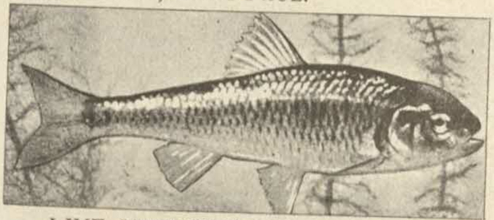
mainly Scandinavian, German, and Canadian. Most of the several thousand Indian descendants of the large tribes that once lived in Minnesota now dwell on reservations in the north. Although over half of the people are urban dwellers, there are few large cities. Nevertheless, Minneapolis and Saint Paul (the capital), with their suburbs, form a metropolitan area of over a million residents. Duluth, the third largest city, is the chief port.

Government and Education. The executive branch of the government is headed by the governor, who is elected for two years. There are sixty-seven members of the senate, who serve four-year terms, and 131 members of the house of representatives, who serve two-year terms. All are elected by non-partisan ballot. A supreme court of popularly elected justices heads the state's judiciary.

The school system of Minnesota is administered by a superintendent of public instruction. The educational system is well integrated and consists of elementary and secondary schools, several teachers' colleges, and the University of Minnesota. Leading private institutions of higher learning include Saint John's and Hamline universities and Carleton, Saint Olaf, Saint Thomas, Saint Catherine's, Macalester, and Gustavus Adolphus colleges.

History. The first white men in Minnesota were Frenchmen who entered by way of the Great Lakes as early as 1654. The first permanent settlement was a fort built in 1679 and named after a Frenchman, Duluth. In 1680 Father Hennepin discovered the Falls of Saint Anthony, and a settlement soon arose here, later to grow into the city of Minneapolis. Great Britain received the eastern region in 1763. Spain received the western portion, later giving it to France. The United States acquired the eastern portion after the Revolutionary War and the western in 1803 as part of the Louisiana Purchase.

The first American settlement was Fort Snelling, built in 1819 at the junction of the Minnesota and Mississippi. But only a few settlements were established before treaties were negotiated with the Sioux and Chippewa Indians, in 1837. Minnesota was established as a territory in 1849 and became a state in 1858. The Sioux Indians, resentful over the loss of their lands, constantly raided the farms and settlements. The trouble reached a climax in 1862 with a great massacre. With the opening of the railroads the state had a rapid growth. See MINNEAPOLIS; SAINT PAUL.



LIVE MINNOWS LURE BIG FISH
Common shiners make uncommonly good bait.

MINNOW, *min'o.* The fresh waters of the Old World and North America are well populated with small fish of many species related to the carp and called *minnows.* The largest of the minnows in America are found in the Colorado River basin, where they are known as the *white salmon of the Colorado River.* These fish may reach a length of five feet and a weight of eighty pounds. The *squawfish* of the Pacific coast is another large minnow. Squawfish may reach a length of four feet. In the eastern part of the continent, *fallfish,* which reach a length of a foot and a half, are probably the largest minnows.

Most of the minnows, however, are less than ten inches long. They are of use in waters in which they live, as they make excellent food for larger fishes. Because of this fact, they are prized as bait, by fishermen. *Shiners* are possibly the best-known minnows.

There are more than a thousand species of minnows known. It is not correct to call any small fish a *minnow.*

MIN'STREL. Knights and ladies of medieval English castles eagerly awaited the arrival of the minstrels, who wandered from place to place telling stories and singing songs in exchange for food and money.

The English minstrels corresponded to the Welsh bards (see BARD). Minstrelsy went out of existence in the fifteenth century.

The modern minstrel show is a performance of black-face entertainers who sing, dance, and exchange jokes. Professional minstrel shows are now rarely seen, but this type of entertainment is popular with amateurs.

MINT. The place where coins are manufactured is a mint, and it is now usually government-owned. The history of mints dates back probably to ancient Lydia in the eighth century B. C.

United States Mints. Prior to the Revolutionary War there were several small mints in the American colonies. In 1792, however, a national coinage act, in accordance with the Constitution, authorized a Federal mint at Philadelphia. At first only copper money was minted; but within two years silver was coined, and gold in 1795. Two other mints, at Denver and at San Francisco, have since been established.

In addition, there are assay offices located in several cities. The Director of the Mint has charge of all coinage and of the gold bullion at Fort Knox, Ky. He is appointed by the President and is attached to the Treasury Department.

Other Mints. The Royal Mint, built at London in 1810, makes coins for those parts of the British Empire and the Commonwealth lacking mints of their own. It also operates branches in Melbourne and Perth, Australia. Canada has its own mint (at Ottawa), as does the Union of South Africa (at Pretoria). For those sections of South and Central America without mints, coinage is made in Europe and the United States.

For additional information, consult the following articles:

Assaying
Bullion
Coins and Coinage
Money
Seigniorage

A BARGAIN! MANHATTAN ISLAND—ONLY TWENTY-FOUR DOLLARS!
Peter Minuit, governor of New Netherland, bought Manhattan from the Carnarsee Indians for sixty guilders' worth of bright trifles. It is now worth over eight billion dollars.

MINT. The mint is a perennial herb which belongs to the family known as *Labiatae.* The plant has square stems and simple leaves, opposite one another. Its leaves are fragrant, as are its small purple, pink, or white flowers.

There are many species of mint, but only twelve of them grow in America. The best-known mints are spearmint, peppermint, and pennyroyal. Sage and catnip also belong to the family.

From the leaves of mints an essential oil is distilled, which is used in perfumes and as a flavoring for meat sauce, candy, medicine, and chewing gum.

MIN'UIT, or MIN'NEWIT, PETER (1580-1641). Manhattan Island, today a part of New York City, was purchased from the Indians by Peter Minuit, Dutch governor of New Netherlands from 1625 to 1631. Fort Amsterdam was built under his guidance. Later he supervised the first work on Fort Christiana near the present Wilmington, Del.

MINUTE, *min'it.* Next to the smallest of the units of time is the minute, the sixtieth part of an hour. The minute also is the sixtieth part of a degree in measuring angles or longitude. See LONGITUDE AND TIME.

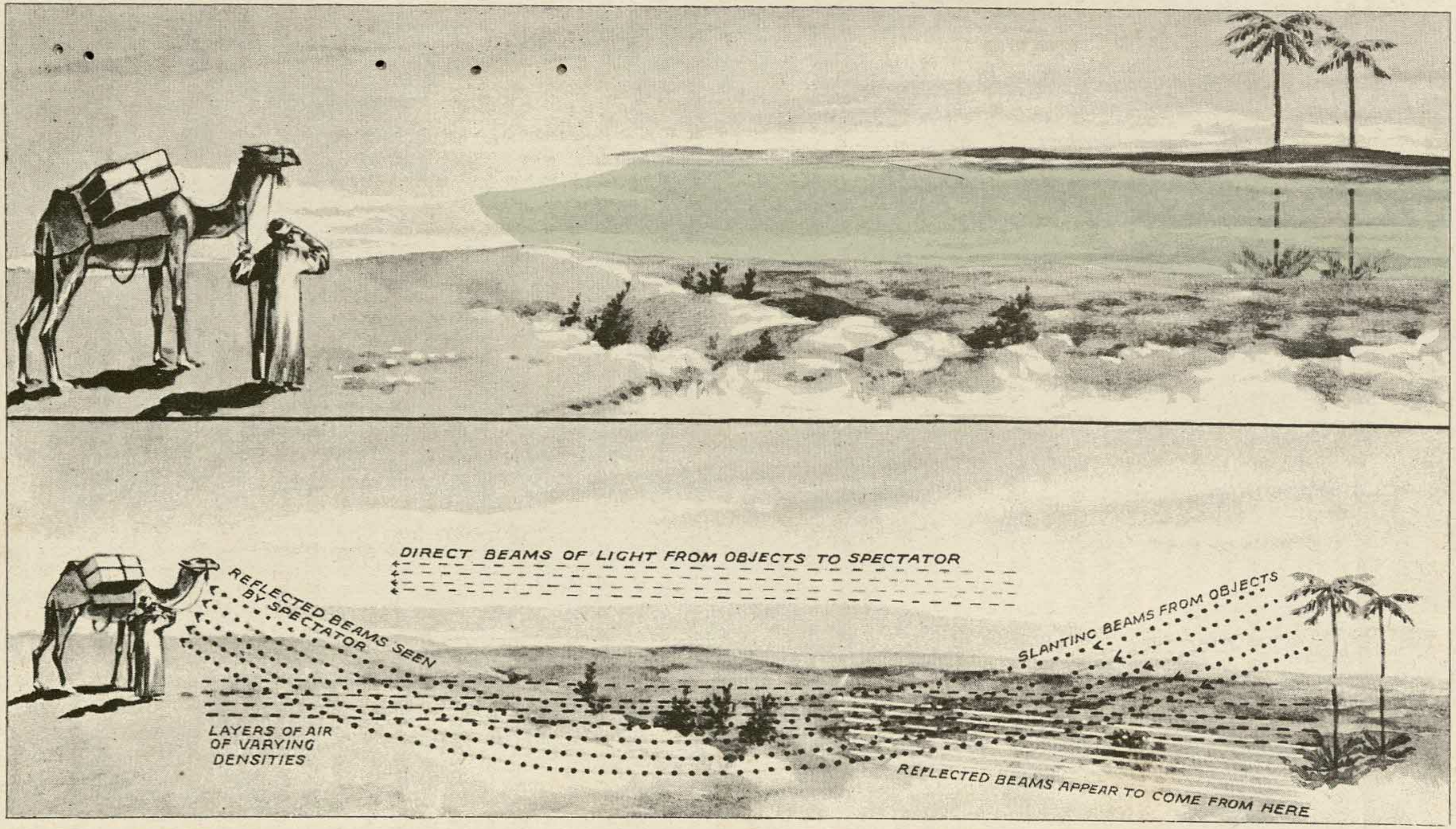
MINUTEMEN, *min'it men.* America's first battles with England in the Revolutionary War were fought by the minutemen, an organization made up of New England patriots. Formed in 1774 by the provincial congress of Massachusetts, the minutemen stood ready to fight at a minute's notice. When the British marched from Boston to Concord on April 19, 1775, to seize the stores and ammunition lodged there, the minutemen, warned the night before by Paul Revere, battled them at Lexington and attempted to check them at Concord. They turned the march of the British back to Boston to an utter rout. Some of the militia in other colonies also were called minutemen.

MIRABEAU, *me ra bo',* GABRIEL HONORÉ RIQUETI, Count de (1749-1791). Leader of the Jacobin party in the first years of the French Revolution, Mirabeau was popularly known as "the tribune of the people." He was a man of noble birth who believed in liberty and popular rights, and in 1789 he rose to prominence in the meeting of the States-General. He defied the king's orders for the third estate to vote apart from the other two. When the new government was formed in 1791, he was elected president of the National Assembly. He died before the Revolution passed into the hands of more radical men. See JACOBINS; FRENCH REVOLUTION.

MIRACLE PLAY. For a period of approximately 400 years, from 1100 to 1500, the miracle plays were the most popular form of drama. Based on the lives of the saints, they were at first presented in churches as a part of Easter mass, gradually becoming more elaborate, until they were presented in the market places of Europe. Guilds were formed to make the presentation of miracle plays regular events, and in France and Italy they became colorful spectacles.

The plays usually dealt with the passion and resurrection, and sometimes with the nativity. A typical play opened with a synopsis by a herald. This was followed by the action, and the play ended with the reappearance of the herald. Although the first miracle plays, written in Latin, were very serious, comic characters and situations were brought in, and these, it is said, constituted the beginnings of modern farce. Later, allegorical characters began to appear in miracle plays, and from that feature morality plays developed. See DRAMA.

MIRAGE, *me razh'.* The desert traveler sometimes hastens toward what seems to be a beautiful lake or an oasis, only to see it vanish in thin air. He has experienced the optical illusion of a mirage. The mirage is explained by the fact that rays of light, passing with considerable slant from a denser to a lighter medium, are bent back into the denser medium. The desert sands heat the air nearest them, so that it becomes lighter than the air layers above. This heated air acts as a mirror facing


DIRECT BEAMS OF LIGHT FROM OBJECTS TO SPECTATOR
REFLECTED BEAMS SEEN BY SPECTATOR
SLANTING BEAMS FROM OBJECTS
LAYERS OF AIR OF VARYING DENSITIES
REFLECTED BEAMS APPEAR TO COME FROM HERE

PARCHED LIPS QUIVER, SUN-BLIND EYES SPARKLE. . . . A FALSE LAKE SHIMMERS ON THE DESERT!

Nature plays one of her cruelest tricks upon the thirsty desert traveler in the phenomenon of the mirage. The sun-baked ground heats the atmosphere near the earth and makes it lighter than the upper air; the sun's slanting rays, passing from the denser layer to the rarer, are bent back into the denser medium, reflected from the heated stratum. Thus the blue sky becomes an inviting pool upon the barren sands.

upward. The slanting rays are reflected by it and appear to come from the ground at the point of reflection; the blue of the sky becomes a miraculous lake, shimmering in the sun. Rays from a far-distant oasis appear to come from near at hand, and if clearly seen, are upside down, as if reflected by water. See LIGHT.

MIR'ROR. Scientifically, a mirror is any smooth surface that reflects, rather than absorbs, light rays. In ancient times, looking glasses, as mirrors are often called, were made of highly polished metal or obsidian, a black, glasslike stone. Today they are usually made of glass which has been coated on one side with silver or aluminum to prevent light rays from passing through.

In the *plane* mirror, the type commonly used in homes, the image seen is the same size as the object being reflected and appears to be as far behind the mirror as the object is in front of it. The sides of the image are reversed, however. For example, the right hand of your image seen in a mirror is where your left hand would be if you were facing in the same direction as your image.

A *concave* mirror is shaped like a section of the inside surface of a hollow sphere, such as a ball. When light strikes it, the light's parallel rays are reflected back to a common point. Called the *focus*, this point is in front of the mirror and directly opposite its center, called the *center* of *curvature*. When an object is between this center and the focus, its image appears beyond the center and is both inverted and enlarged. When an object is farther away from the mirror, the image appears inside the center of curvature, inverted but smaller. But when the object is between the focus and the mirror, its image is upright and larger. Dentists' mouth mirrors and many of the reflectors in auto, bicycle, and search lights are concave.

The *convex* mirror is the opposite of the concave. Shaped like a section of the outer surface of a sphere, it curves outward and toward the object, rather than inward and away from it. In such a mirror, the image seems to be in back of the mirror, always appears right side up and very distinct, but is always smaller than the object. Some automobile rear-view mirrors are of this type. See LIGHT.

MISDEMEANOR. See CRIME.

MIS'SAL. Containing the complete service for mass throughout the year, this book was authorized for use in most Roman Catholic churches in 1570. As revised later, the missal is still in use.

MISSILE, *mis' il,* GUIDED. A fearsome weapon of modern warfare is the guided missile, which is not merely aimed like a shell or bomb, but is directed during its flight toward a target. Bombs which can be steered from a bombing plane after they have been dropped are a type of guided missile, but far more important are those projectiles which move under their own power. This power may be supplied by rockets, by jet engines, or by a combination of the two.

The "V" weapons were an early form of guided missile, used by Nazi Germany to bomb the city of London during World War II. The first of these missiles, launched from giant platforms across the Channel from England, were controlled only by built-in mechanisms which could be set to direct their flight and, through a timing device, cause them to drop. Improvements came rapidly, however, and in the period after the war the great world powers spent enormous sums on the development of a wide variety of guided missiles.

Equipped with extremely complicated electronic devices, pilotless "flying bombs" with atomic warheads can soar far above the earth, travel for great distances at supersonic speeds, and descend directly on a target. In some cases they may be directed by a ground crew, using radar, television, and radio signals to track and correct their flight. In others, they may guide themselves, sometimes by using the stars to keep them on course. "Homing" missiles will follow moving targets and explode when they are within range. They may be used by aircraft in combat, and planes can also let loose guided missiles directed at targets on the ground. Antiaircraft installations on the ground can use guided missiles to seek out and destroy enemy aircraft. And missiles can be launched from the ground to fall on far-off enemy territory. Still another launching site is provided by naval vessels, which can approach an enemy coast before firing their deadly weapons.

MISSIONS AND MISSIONARIES. Usually supported by a church or other religious organization, many missionaries have devoted themselves to introducing and to spreading their faith in many lands. Since the days of Christ, Christian missionaries have gone into foreign lands to win converts through their preaching and their efforts to improve the lot of the natives. Besides building churches and chapels and striving to spread their beliefs, many have established hospitals and provided medical care; maintained schools and taught secular as well as religious subjects; and helped to improve living conditions generally.

Soon after the discovery of America, European missionaries went into many parts of the New World to preach Christianity to the Indians. Among those who engaged in this work were Spanish, French, and Portuguese Catholics; John Eliot, the famous English Protestant; and various French Huguenots, also Protestant. The Oriental countries, including India, Japan, and China; Africa; and the territory of the Eskimos in Alaska and Labrador — all have long been favorite fields of Christian missionaries and have been deeply influenced by their work. Even in the United States, "home missionaries" continue to work for converts. There, too, some of the missions established by Catholic orders in California, Arizona, and Texas in the 1700's are still in use.

In many instances, missionaries have been persecuted and even put to death. That this does happen was proved in China under Communist rule, where many formerly beloved missionaries were killed, driven out, or brutally mistreated. But generations of missionaries have won the love and devotion of the people among whom they have worked in Christ's name.

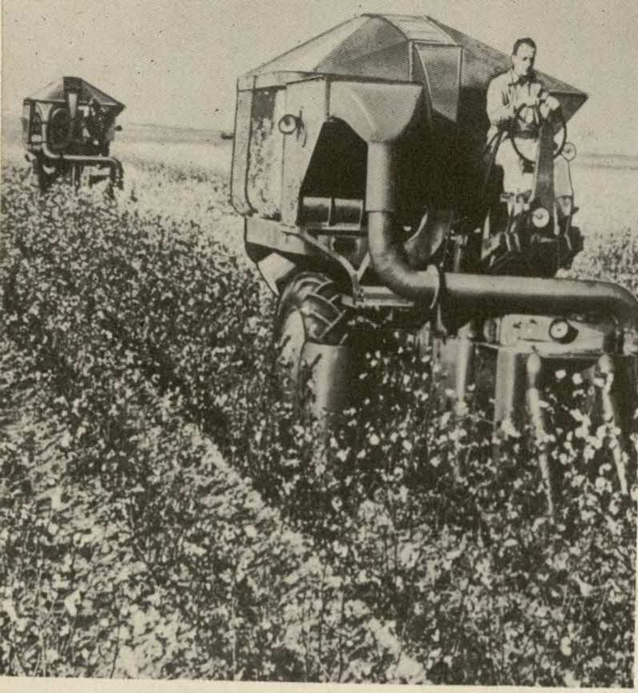
Biloxi Chamber of Commerce

JEFFERSON DAVIS' "BEAUVOIR"
Here, in historic Biloxi, lived the Confederacy's president. The house later became a home for Confederate veterans and widows.

MISSISSIPPI, *mis ih sip' ih.* Situated in the heart of the Deep South and the Cotton Belt, Mississippi is called the "Magnolia State," or sometimes the "Bayou State." Alabama borders it on the east; Tennessee on the north. The winding Mississippi forms its entire western boundary, separating it from Arkansas and Louisiana. Over half of its southern boundary is formed by an arm of Louisiana; the rest juts southward to the Gulf of Mexico. Covering 47,716 square miles, the state has 2,184,000 inhabitants; nearly half are Negroes.

Geography. Mississippi reaches its greatest altitude, only slightly over 800 feet, in the Tennessee River Hills of the northeast. Near its center, a ridge of low hills divides it into two chief river basins: a western one, with streams emptying into the Mississippi, and an eastern one, whose rivers drain directly into the Gulf. Chief of the western-flowing rivers are the Big Black and the Yazoo; the Pearl, Pascagoula, and Tombigbee are the most important of the eastern basin. The Delta, the state's richest section, between the Mississippi and the Yazoo, is so low that it must be protected by levees along both rivers (see LEVEE).

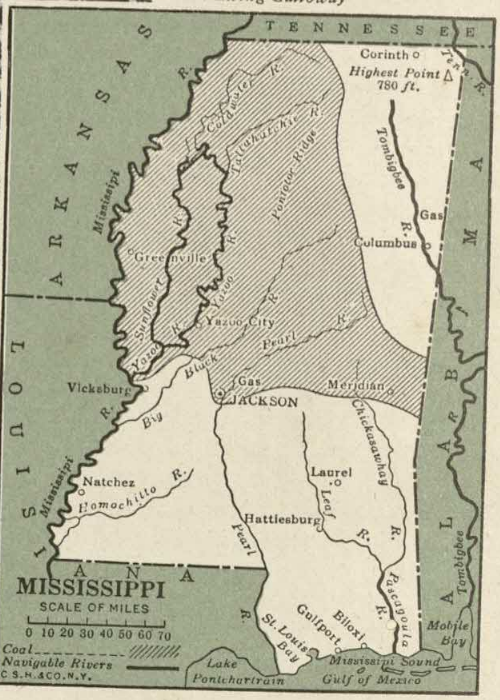
Mississippi has a semitropical climate, the average temperature for its short win-



IN THE LAND OF KING COTTON

Many new crops have been introduced, and many new industries have been developed, but cotton will probably always play a leading part in Mississippi's agricultural economy. Cotton growing, too, has changed with the times, and the mechanical cotton picker has done much to save time and labor in the fields at harvest.

From Ewing Galloway

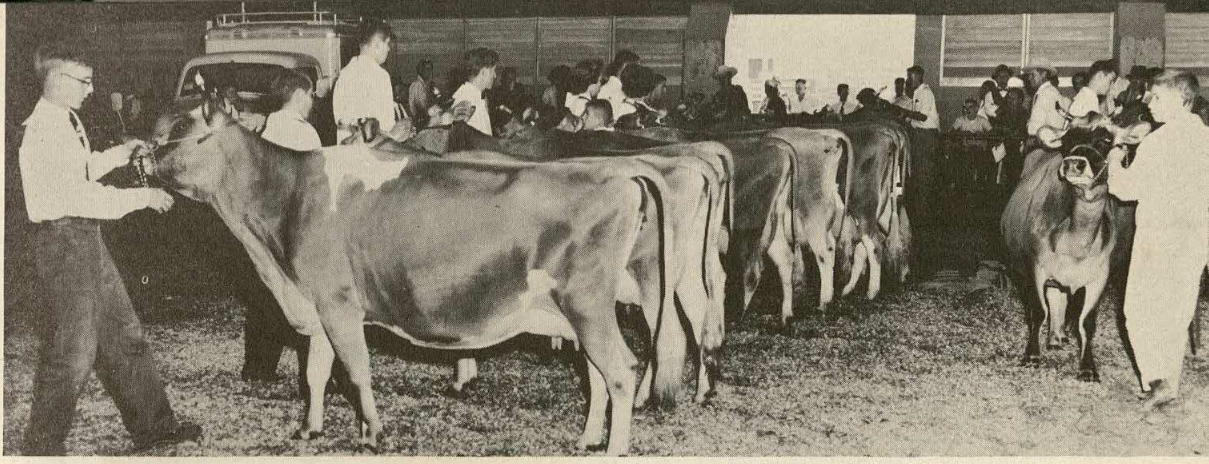


ters being about 45°F; in the summer the average is about 81°. The balmy Gulf breezes are so effective that the thermometer seldom climbs to 100°. Mississippi, especially along the Gulf, has become a popular winter resort. Rainfall in the state averages fifty inches a year, the heaviest precipitation occurring along the southern coast.

In general, Mississippi is poor in minerals, but beginning around 1939, discoveries of petroleum and natural-gas deposits greatly increased its mineral wealth. Oil and gas are now produced in large quantities. Other mineral products include clay, sand and gravel, lignite, limestone, sandstone, bentonite, and gypsum.

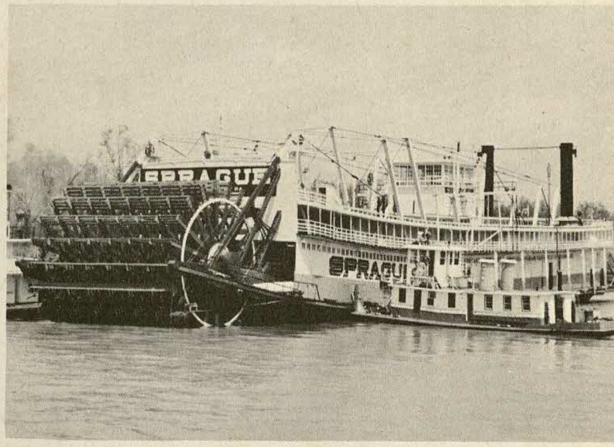
Occupations. Agriculture is, by far, the leading industry. The fertile soil, the plentiful rainfall, the mild climate, and the abundance of cheap labor make farming exceedingly profitable. Leading the list of crops is cotton; fully half the farm land is devoted to this crop alone. The Delta is the country's leading section for the raising of long-staple cotton. Other important crops are corn, oats, pecans, and sweet potatoes. Of lesser importance are wheat, peanuts, hay, tobacco, sugar cane, oranges, and figs. In recent years the raising of vegetables, fruits, melons, and dairy cattle and other livestock has become increasingly important.

Lumbering is a major industry. In the south are extensive yellow-pine forests; in the north, walnut, oak, hickory, and other hardwoods are prominent. Wood pulp, turpentine, resins, and other forest products are economically important. Fish, shrimp, and oysters are taken from Gulf waters. Important manufactures include cottonseed, tung-oil, soybean, and peanut products, textiles, butter and other dairy products, and processed foods. Modern science has greatly bolstered Mississippi's industry by developing a wide variety of uses for the state's vegetable oils.



Mississippi Agricultural & Industrial Board

Biloxi Chamber of Commerce



Mississippi Agricultural & Industrial Board

SHOWS AND FESTIVALS HIGHLIGHT MISSISSIPPI ACTIVITIES

Top, 4-H youth exhibit some of the state's finest Jersey cattle at the Mississippi State Fair in Jackson. Left, the Shrimp Festival and Blessing of the Fleet are annual events at Biloxi. Right, a stern-wheeler serves as a Little Theater at Vicksburg's river front.

Transportation. In the state there are more than 4,000 miles of railroads and 7,000 miles of highways. The Mississippi and Yazoo rivers are important waterways to the sea. Both transcontinental and local airlines also serve the state.

Government, Education, and Religion. The chief executive of Mississippi is the governor, assisted by a lieutenant governor, secretary of state, attorney-general, treasurer, and auditor, each elected for a four-year term. The legislature has forty-nine senators and 140 representatives, elected to four-year terms. The supreme court consists of eight judges, serving eight-year terms. Before any citizen can vote, he must be able to read the state constitution or indicate that he understands it.

Education is under the supervision of a state board of education which includes the superintendent of education. State-supported institutions of higher learning include the University of Mississippi, Oxford; Mississippi State University, Starkville; Mississippi State College for Women, Columbus; Mississippi Southern College, Hattiesburg; Delta State College, Cleveland; and three Negro senior colleges: Alcorn Agricultural and Mechanical College, Lorman; Jackson State College, Jackson; and Mississippi Vocational College, Itta Bena.

The strongest religious denomination in

Mississippi is the Baptist.

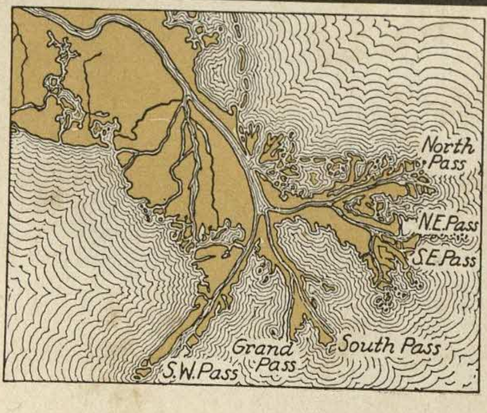
History. Hernando de Soto passed through Mississippi in 1541, but no claims were made on the land until the arrival of Sieur Robert Cavelier de La Salle in 1682 when the region was claimed for France. However, the first colony was not established until 1699 by Sieur Pierre Lemoyne d'Iberville at Biloxi. In 1763 the land passed to British rule and prospered. In 1781, the southern part fell into Spanish hands. Then by the Treaty of Paris in 1783, the border was fixed at the thirty-first parallel. A long dispute rose between the United States and Spain until, in 1795, Spain gave up her claims to lands north of 31°. Three years later, Mississippi became a territory and in 1817 was admitted to the Union as a state. Jackson was selected the capital in 1821. Northern and central Indian lands were ceded to the state in 1830 and 1832. In 1832 a new constitution was adopted.

At the outbreak of the War between the States, Mississippi quickly joined the Confederacy and Jefferson Davis became its president. During the war, much of the state was laid waste by such famous battles as Shiloh, Corinth, and Vicksburg, and during the reconstruction it suffered from the misrule of the "Carpetbaggers." It was finally re-admitted to the Union in 1870. See Jackson; Vicksburg.

MISSISSIPPI RIVER. No river has quite the glamor, romance, or importance of this majestic stream discovered in 1541 by the Spanish explorer, Fernando De Soto. Its Indian name means *Father of Waters.* From its source in northern Minnesota to its delta on the Gulf of Mexico, its length is 2,348 miles, and with its tributaries, it drains an area of 1,240,000 square miles. The river was explored by Père Marquette and Louis Joliet in 1673, and in 1682 La Salle, following the river to its mouth, named the valley Louisiana. Cities and towns grew along the river and it became the western frontier until the Louisiana Purchase. In the 1800's, it became a highway for steamboats carrying cotton, grains, and supplies between New Orleans and Saint Louis.

"Old Man River" has its source in Lake Itasca, Minn., but the head of navigation is at Minneapolis and Saint Paul. It receives the waters of the Wisconsin, the Illinois, the Missouri, the Ohio, the Arkansas, and the Red rivers. After passing New Orleans, the river flows another 110 miles through a series of Passes in a large delta, and thence into the Gulf. It forms the boundaries of ten states and flows through parts of two of them—Minnesota and Louisiana.

Occasionally the Mississippi causes disastrous floods. Although the levees help hold back the waters, additional aids are necessary. These include artificial cutoffs, which reduce flood stages, and dams, which not only control floods but also provide hydroelectric power. The great Missouri-Mississippi system forms the longest waterway in North America, the combined rivers having a length of 5,031 miles. See also Delta; Flood; Jetty; Levee; Missouri River.

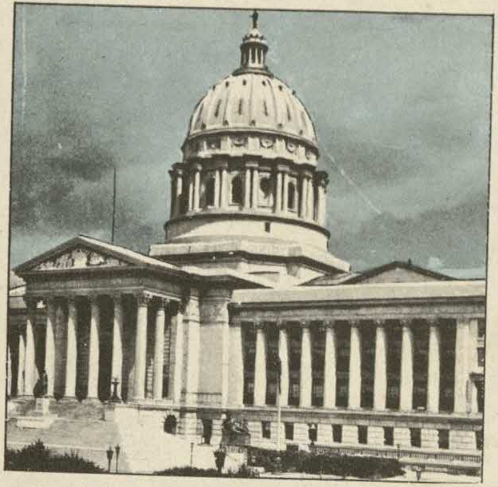


RIVER TRAFFIC KEEPS ROLLING ALONG

The Mississippi River has been an important water highway since frontier days. Canoes, rowboats, and rafts carried everything from lumber to livestock. Luxurious paddle-wheel steamboats had their day of glory in the 1800's. The river is still a busy waterway. Powerful motor vessels nudge huge strings of barges up and down the river, such as this 21-barge tow, carrying coal, minerals, steel, oil, and grain. The Mississippi also carries another commodity—soil from its own banks. This is deposited in the delta south of New Orleans at the rate of 400,000,000 tons annually. The detailed map of the river's mouth shows the river's major outlets, called the *Passes*.

Courtesy Monsanto Magazine, Monsanto Chemical Company

MISSISSIPPI SCHEME. In 1717, when France owned the Mississippi Valley, a plan was launched by John Law, a Scotsman, to develop and colonize the territory drained by the great river. He sold shares in a company to the citizens in Paris, and so great was the interest that the value of the shares skyrocketed. The government joined in the scheme, since it also included a plan for banking and relieving the depleted finances of the state. Paper money based on the value of the land was issued. Soon the money depreciated in value along with the stock; the plan was never carried out, and Law was forced to flee the country. See LAW, JOHN.



ON THE BANKS OF THE MISSOURI
Missouri State Capitol at Jefferson City.

MISSOURI, *mi soo′ri,* or *mi zoo′ri.* With its vast agricultural, mineral, and forest resources, Missouri beckoned to the early pioneers, who were seeking rich lands on which to build new homes. Missouri's fertile, rolling plains and forest-covered mountains supplied their needs so well that the state was quickly settled. It soon became the gateway to the Southwest. From these early beginnings, the "Show Me State," as it is popularly called, has developed into one of the most flourishing and productive regions in the Union.

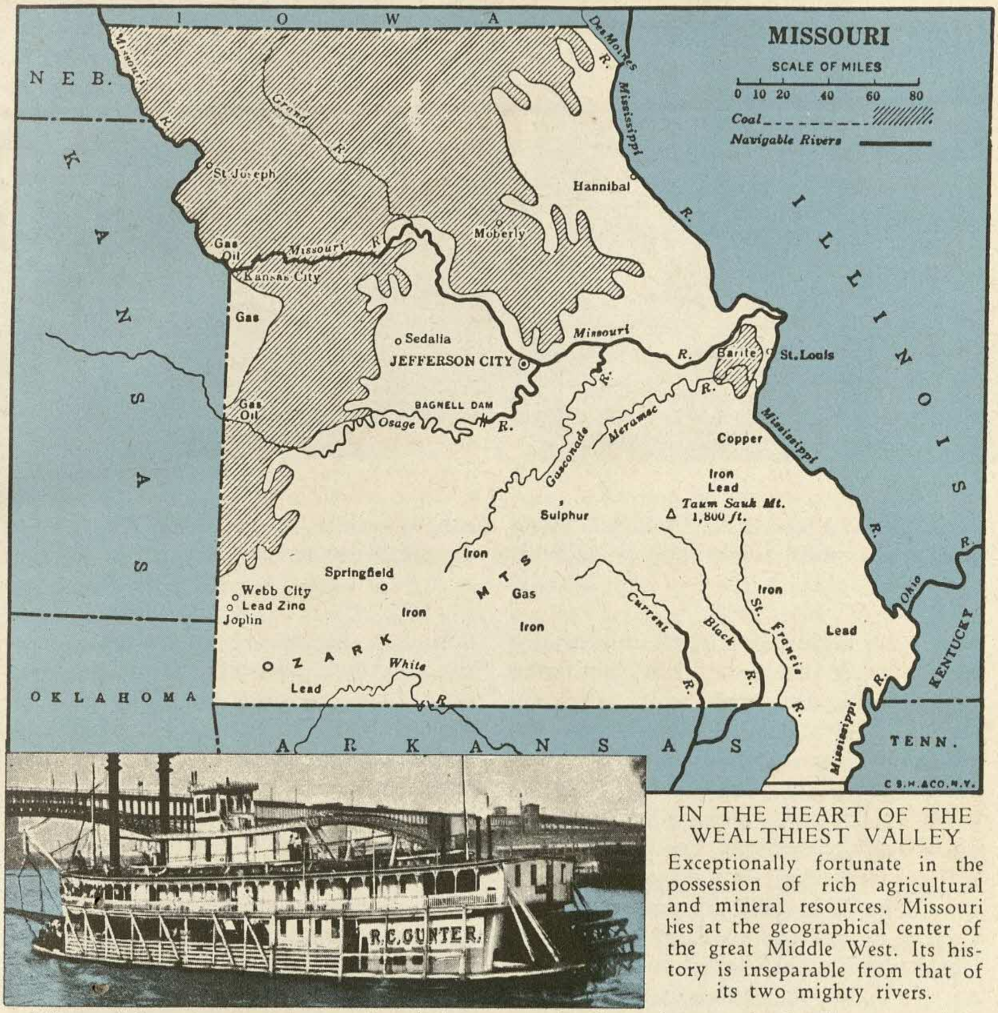
One of the Middle Western states, Missouri adjoins Iowa on the north; Nebraska, Kansas, and Oklahoma on the west; Arkansas on the south; and Illinois, Kentucky, and Tennessee on the east. Its eastern boundary is formed by the Mississippi River. It has an area of 69,674 square miles, ranking nineteenth in size among the states.

Surface Features. Missouri is composed of two topographic regions, one rough and the other smooth, lying on either side of the great Missouri River, which divides the state into two unequal portions. South and east of the river lies the rough Ozark region; to the north and west stretch the rich, rolling prairies. Like a huge backbone stretching from the Mississippi River to the southwest corner are the Ozark Mountains, reaching almost 1,800 feet above sea level. This region is cut by many deep and narrow valleys.

Although Missouri is an inland state, it has a vast water territory. Along the eastern border is the Mississippi River; the Missouri, with its many tributaries, drains the prairie region. Numerous other streams also drain the state. In the Ozarks there are several fast-running rivers, such as the Osage, the Current, and the White, which provide excellent water power.

Climate. Missouri has cold winters and long, hot summers. There are great extremes of temperature, with the thermometer ranging from several degrees below zero in the winter to more than 100° in the summer. In the Ozarks there is a more equitable climate because of the elevation. The rainfall is irregular and varied. In the north it averages fifteen inches less than in the south, while in some parts there are frequent droughts.

Natural Resources. Missouri is well supplied with mineral resources. It ranks first among the states in the production of lead, and at one time ranked first in the production of zinc. Next in importance are the coal fields, lying in the northern and western portions; and there are extensive deposits of iron ore in the mountain sections. Other important minerals include building stone, clay, copper, and barite.



IN THE HEART OF THE WEALTHIEST VALLEY

Exceptionally fortunate in the possession of rich agricultural and mineral resources, Missouri lies at the geographical center of the great Middle West. Its history is inseparable from that of its two mighty rivers.

Missouri has a generous supply of timber, more than half of which is found in the Ozark Mountains. The principal trees are oak, gum, and cedar. Fish abound in all the rivers of the state, and are especially plentiful in the Mississippi and Missouri rivers.

Farming. Missouri holds an enviable place in the agricultural development of the United States. Situated in the center of the principal farming region of the nation, it excels in the variety and quantity of staple crops produced and in the profitable raising of livestock. The level lands of the north, west, and southeast sections have rich soil that is well adapted to the production of corn, the leading crop. Missouri ranks with the leading states in the production of corn. It is also an important source of the nation's wheat.

Other important crops of the prairie regions are oats, rye, barley, and potatoes. Livestock raising is the chief industry of the central sections. For a long time Missouri has produced commercial fruit crops, of which apples, raised in all parts, are by far the most important. Peaches, cherries, plums, and other small fruits are also raised. In the lowlands of the southeast, considerable cotton is raised.

Industry and Commerce. Although Missouri is chiefly an agricultural state,

Randazzo and Morrison, Inc.

KANSAS CITY PLAZA OFFERS PARK ABOVE, PARKING BELOW
Municipal center includes park, underground garage, and the block-square auditorium at right.

it is also highly developed industrially. Its central location, excellent transportation facilities, and nearness to, or possession of, raw materials have fostered the growth of factories. By damming many of its rivers, the state has also been able to produce electricity for running many industrial establishments. The largest of its hydroelectric plants is at Bagnell Dam on the Osage River. The scenic Lake of the Ozarks, created by this dam, is one of the world's largest artificial lakes and the center of a widely popular recreational center.

The state is one of the largest centers in the United States for manufacturing boots and shoes, milling flour and livestock feed, and slaughtering and packing meats. It also leads the world in making corncob pipes. Other leading industries include printing, publishing, ore smelting, petroleum refining, cotton ginning, brewing, automobile assembling, coffee roasting and grinding, lumber milling, and the processing of foods and tobacco. Among the many manufactures are automobile and airplane parts, electrical equipment, iron and steel products, chemicals, drugs, medicines, glass, leather, furs, clothing, paints, and rubber, clay, and timber products.

Modern highways and railroads crisscross the state, and both Saint Louis and Kansas City are among the nation's leading rail and airline centers. The Mississippi and Missouri rivers also provide fine navigable waterways for the shipment of freight. With such excellent transportation facilities, Missouri has an extensive commerce, and Saint Louis and Kansas City serve as main points of shipment to the Southwest from all parts of the country.

The People. Missouri has about 4,350,000 inhabitants, most of whom are native-born Americans. Over 60 per cent of its people live in urban areas, the largest cities being Saint Louis, Kansas City, Saint Joseph, and Springfield. Missouri has given the nation many outstanding men, including Harry S. Truman, thirty-third President, authors Mark Twain and Eugene Field, Congressman "Champ" Clark, General Pershing of World War I fame, and George Washington Carver, Negro scientist.

Government. Missouri elects its governor and other state officers for four-year terms. Its senators serve for four years; its representatives for two. A supreme court heads the state judiciary. Jefferson City is the capital.

Education. Missouri's school system was established in 1835. The system is administered by a state superintendent and is operated on a district plan. School attendance is free and compulsory for children from seven to fourteen years of age. The state maintains several colleges, the University of Missouri, and Lincoln University. Other educational institutions include Washington and Saint Louis universities; the University of Kansas City; Culver-Stockton, Stephens, and Lindenwood colleges; and Kemper Military Academy.

History. When La Salle, in 1682, claimed for France the territory that is now Missouri, it was not the first time that white men had been there. Marquette and Joliet had explored the region nine years before, and De Soto had traveled through it in 1541. The French began to explore the territory thoroughly, and in 1735 the first permanent settlement was set up at Sainte Genevieve. It was followed by several others, but the most important came when Saint Louis was established in 1764. In 1763 all land west of the Mississippi River became the property of Spain, which held it until 1800, when it was returned to France. The United States acquired it three years later by the Louisiana Purchase.

Missouri had a population of more than 20,000 when it became a territory in 1812. It became a state in 1821, following a long and hard-fought battle over the slavery issue. Missouri was brought into the Union as a slave state, but not before the famous Missouri Compromise had provided that all the territory north of parallel 36° 30′ should be forever free. It was a vain hope that this agreement would settle the slavery problem.

Saint Charles became the first capital of the state, but Jefferson City was chosen in 1826. Missouri maintained a neutral position during the Civil War, and sent troops to the armies of both the North and the South. See JEFFERSON CITY; KANSAS CITY; SAINT LOUIS.

MISSOURI COMPROMISE. Like a "firebell in the night," as Thomas Jefferson called it, the Missouri Compromise was the first warning of civil war in America. Henry Clay was the moving spirit behind the compromise, which permitted Missouri to come into the Union as a slave state, but set the parallel of 36° 30′ as the dividing line for slave and free territory. Maine was admitted a free state in 1820. The compromise definitely divided the United States into North and South, and was the basis for the increasing bitterness that led to the war in 1861. The compromise was passed by Congress, March 6, 1820. See CIVIL WAR IN AMERICA.

MISSOURI RIVER. Rising in the southwestern part of Montana, the Missouri is formed by the junction of the Jefferson, Gallatin, and Madison rivers, which have their sources in the Rocky Mountains. The Missouri flows in a swift and muddy course for nearly 2,500 miles, to the point where it joins the Mississippi River near Saint Louis. Including the Jefferson River, it is 2,950 miles long. It is a treacherous stream, with frequent shallows and rapids, and often it rises high above its banks, inundating the towns that line its course. It is often thought of as merely a tributary of the Mississippi, but in reality it is the longer river of the two. It is, however, surpassed by many other streams in the value of its commerce.

From its source the Missouri flows eastward across Montana, then turns to the southeast in its course through North Dakota. It passes through South Dakota and then forms the eastern boundary of Nebraska, separating that state from Iowa and Missouri. Continuing southward, it divides Kansas and Missouri as far as Kansas City, where it bends to the east and passes through the entire state of Missouri to reach the Mississippi.

Fort Peck Dam in Montana, the first of the great dams on the Missouri and its tributaries, was completed in 1940. Cities on the river include Great Falls, Bismarck, Pierre, Sioux City, Council Bluffs, Omaha, Atchison, Leavenworth, and Kansas City. The Missouri's leading tributaries are the Osage, the Grand, the Kansas, the Platte, the Dakota, the Niobrara, the James, the White, the Cheyenne, and the Yellowstone.

Lewis and Clark explored the river valley in 1804, and in the early 1800's the river became a great highway for the settlers and pioneers of the Northwest.

MIST. See Fog.

MISTLETOE, a parasitic plant that is famed for its decorative use at Christmas time. It is usually found growing on oak or cypress trees and is identified by its greenish twigs, each bearing rough, green leaves. During the growing season, the plant has small, yellowish flowers, while in the winter months it has glossy white berries.

Mistletoe grows in Europe and America, although the varieties are not closely related. Centuries ago, the druids of Great Britain considered the plant sacred. Only the priests could cut it from the trees with golden knives. The twigs were then distributed among the people as a charm against evil.

MITES, parasites that bore into plants and animals. They belong to the same class as spiders and vary in size, ranging from almost invisible to a half inch in length. The *pear-leaf blister mite* is one of the most common of fruit-tree pests. The *red spider mite* attacks house plants. The *chicken mite* infests hen houses and is best controlled by a kerosene spray. The *jigger* is especially irritating to man (see Jigger). Nearly all mites are injurious and spread disease. A few, however, attack insects and destroy their eggs.

MITHRIDATES VI, *mith ri da' teez* (135-63 B.C.). A great warrior and a powerful enemy of Rome, Mithridates was king of Pontus on the Black Sea. He was born at Sinope. He had a Greek education and could speak twenty languages.

The Roman general Sulla defeated him in battle in 84 B.C. The next year, his territory was invaded by the Romans, but he suffered no great loss. In 74 B.C., the Asiatic king tried to save Bithynia from the Romans. At first, he was successful and recovered a large part of his dominions. The Romans then gave Pompey complete power in the East, and Mithridates was defeated by the superior Roman army in 66 B.C. and he fled to Armenia. His own son revolted and seized the throne, and Mithridates killed himself.

He was a great figure in ancient times, widely known for his courage and strength, but he was also known for his cruelty. His interests were widespread, ranging from poetry and art to magic and poisons.

MOC'CASIN SNAKE. This member of the poisonous pit-viper family is common in the southern part of the United States. It is one of the largest venomous reptiles of North America, often reaching a length of more than four feet. In color the snake is dark brown above, marked with indistinct bands of black; the underside is black with yellowish splotches. The body is thick and heavy, tapering to a slender tail; the head is flat and wedge-shaped. A distinguishing characteristic of the moccasin is the white lining of the mouth, easily seen when the snake draws back its head and opens its jaws to strike. From this peculiarity the reptile gets its local name *cottonmouth moccasin.*

Another name, *water moccasin,* is given these snakes because of their habits. They live in swamps and streams, and spend much of the time in the water seeking frogs and fish for food, or lying along branches which overhang the water.

Unlike most snakes, moccasins are apt to attack when they are disturbed. Their venom is deadly, and a bite from one of these snakes requires instant first-aid measures (see First Aid). The victim should then be taken to a physician for further emergency treatment.

MOCKINGBIRD. Most widely known of all American singing birds is the mockingbird. In former years it was much sought after as a cage bird and was shipped to all parts of the world, but this practice is now unlawful.

The mockingbird ranges over the southern half of the United States, and is also seen in the northeastern states. It is a slim,

From one of a series of oil paintings, "A History of Pharmacy in Pictures," commissioned by and copyrighted by Park, Davis & Co.; reproduced by special permission. George A. Bender, project director; Robert A. Thom, artist.

ROYAL POISONER TESTS NEW FORMULA

Mithridates VI, King of Pontus, made a lifetime study of the art of poisoning, as well as the art of preventing and counteracting poisoning. Many prisoners of war were his "guinea pigs," but he did not hesitate also to test poisons on himself. His famous formula "Mithridatum," an alleged all-purpose antidote, was used for more than a thousand years.

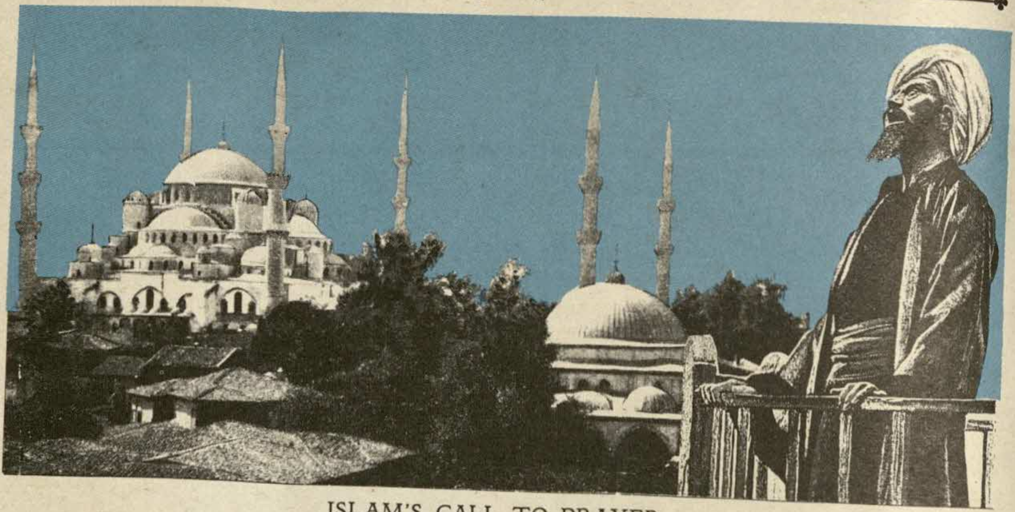
gray bird with white trimmings on the under parts and outer edges of the tail. Like its northern relatives, the catbird and the brown thrasher, it delights in thickets, but is much at home about dwellings even in villages and cities. Its food consists of insects and fruit, and the mockingbird often does considerable damage to crops of fruit.

The mockingbird has a good song of its own, but much of its vocal performance is an imitation of the songs of other birds. There is a record of one that mimicked thirty-two other birds in a few minutes.

MO'HAIR. Made from the hair of the Angora goat, mohair is a glossy, lustrous, durable fabric used principally for upholstery and in a lightweight cloth for wearing apparel. Marketable mohair fibers are usually about seven inches long and are fine and silky and generally pure white. The Angora goat was originally native to Asiatic Turkey, but has been introduced into the United States, Australia, Africa, and New Zealand.

MOHAM'MED, or **MAHOM'ET** (about 570-632). One of the world's great religions, Mohammedanism, was founded by Mo-

~~229~~ D/132



ISLAM'S CALL TO PRAYER

Five times daily, more than 425 million Moslems show their "entire submission to the will of God" as they face Mecca at the muezzin's call (right). Left, Istanbul mosque.

hammed, an Arabian who today is revered by about 425,000,000 people as the Prophet of Allah. Mohammed was born in Mecca and was reared by an uncle. When he was about twenty-five years old, he was employed by a wealthy widow as camel driver in her caravans. Sometime later he married his employer.

Mohammed had long been given to deep religious thinking. He was familiar with the Bible and with religious philosophy and the legends of the East. When he was about forty, he claimed that the Angel Gabriel had revealed to him a number of doctrines. Ten of the citizens of Mecca became his followers, but otherwise he met wide opposition. Learning that he was to be killed, he fled to Medina. His flight, known as the *Hegira,* occurred in 622, and with this date the Mohammedan calendar begins.

In Medina the new faith spread rapidly, and in time Mohammed instructed his followers to secure converts by conquest. When all Arabia had been conquered, Mohammed planned to invade Syria and to attack the Roman Empire. But he died before he could carry out his ambitious schemes. See HEGIRA; MOHAMMEDANISM.

MOHAMMEDAN ARCHITECTURE. Minarets and pointed arches characterize Mohammedan architecture, a building style found throughout Egypt, Persia, Turkey, India, and Spain, and also known as Saracenic or Moorish architecture. The buildings are a combination of styles which had existed in the countries conquered by the Mohammedans. Domes also are found on the mosques, palaces, and tombs, the main structures included in this form of architecture, and rich colors and decorations are predominant.

The minarets are several stories in height, and at the top are balconies where the muezzin appears at specified times to give the call to prayer. Stucco is used in decoration. The oldest example of Mohammedan architecture is the mosque at Kairouan, North Africa, built in the seventh century. See ALHAMBRA; MOSQUE; TAJ MAHAL.

MOHAMMEDANISM, *mo ham'e dan iz'm.* "There is but one God (Allah), and Mohammed is His Prophet." For more than 1,300 years this declaration of faith has resounded through the deserts and oases of Africa, the exotic cities and sweeping vistas of Asia, and even into Europe and North America. It is the creed of Mohammedanism, newest of the great religions of the world.

Mohammedanism, founded by Mohammed, is similar in many respects to the

TRAINING COLLEGE BANIPUR.

~~5801~~

Jewish faith. The cardinal belief is in one supreme God who has absolute and perfect power. The Old Testament is accepted with reservations. The Koran is the sacred book of the Mohammedans, just as the Bible is sacred to Jews. Regulations concerning the eating of meat are modeled after those of the Jews.

Mohammedans believe in sinless angels of God; genii of good and evil who are born of smokeless fire; prophets and apostles, including Adam, Noah, Abraham, Moses, Jesus, and Mohammed; and a day of judgment. They also hold to a belief that God plans everything.

Every Mohammedan must turn his face to the holy city of Mecca five times a day and pray; and on Friday his prayers must be said in a mosque. He is also required to give alms and to fast during the month of Ramadan. If possible, he must visit Mecca at least once in his life, during a fixed time in the year. This is called the *Hadj* (or *Hajj*), and when completed it makes the pilgrim a *Hadji.* The Mohammedan must also abstain from intoxicating liquors, music, gambling, and usury and must not paint or carve portraits of man.

There are two divisions of Mohammedans, the Shiites and Sunnites. The Shiites believe that Ali, son-in-law of Mohammed, was the true successor of the prophet; the Sunnites are of the opinion that Abu Bekr, his father-in-law, was the successor. Most of the Shiites, or Shiahs, are in Iran, but many are also found in parts of Arabia, Iraq, North Africa, and Pakistan. However, the Sunnites, considered Orthodox Mohammedans, predominate in most Moslem countries.

During the eighth century the Mohammedans conquered the entire southern Mediterranean coast. They also held sway in Spain, where they were called Moors. Today there are more than 315,000,000 Moslems in the world. See MOHAMMED.

MOHAVE, *mo hah′vay.* Living much as they did before the coming of the white men, the Mohave Indians adhere to time-honored customs. They reside on a reservation along the Colorado River in Arizona, and grow their own pumpkins, beans, melons, and corn. They also are highly skilled in the making of pottery and baskets. The Mohaves still follow the practice of tattooing their bodies.

MO′HAWK. Once proud Indian warriors, mightiest of the powerful Iroquois Confederacy in New York, the Mohawks today are farmers in Ontario, Canada. They dwelt along the lower Mohawk Valley in the old days, and when the early Dutch and French settlers brought firearms, the Indians learned how to war in white man's style. They were unsuccessful in their wars with the settlers, and after their defeat in the Revolutionary War, many of them went to live in Canada. See FIVE NATIONS, THE; IROQUOIAN INDIANS.

MOHICAN, *mo he′kan.* James Fenimore Cooper, in his *Last of the Mohicans,* describes the Mohican Indians, a tribe belonging to the Algonquians. Once residents of the Hudson River Valley and fierce enemies of the Mohawks, they now live near Green Bay, Wis. The Mohicans were noted for their fine physique and high degree of civilization.

MOLAS′SES. A by-product of the sugar-refining process, molasses is a syrup commonly classified by such names as *golden drip, New Orleans, sugarhouse, West Indies,* and *blackstrap.* Second and third refinings yield dark molasses, owing to the impurities present. Although sometimes used as a sugar substitute, molasses is only sixty per cent as sweet as sugar. Cane and maple molasses are used for human consumption, and beet molasses is commonly fed to stock in mixed feeds. Molasses is also used in making rum. See SUGAR.

MOLD. Growing rapidly in warm, damp surroundings, mold is that soft, furry growth so often found on bread and other foods. Like some types of fungi, mold reproduces by spores which swell and distribute their small hairlike threads in all directions. These bear spore cases, and thousands of new spores appear. *Black, blue,* and *leaf* molds present a serious prob-

~~8036~~ 6336

lem for the fruit and vegetable grower. Mold can best be controlled by keeping the air cool and dry.

MOLE. The slightly raised ridges made by moles as they dig their feeding tunnels close beneath the surface of the ground are familiar sights wherever these creatures live. They are found in almost every part of the world.

The animal itself is seldom seen because of its habit of almost continually living underground and its ability to escape capture. It is a strong little miner, well-adapted to the life it leads, with its soft velvety fur, slender flexible snout, almost complete lack of eyes and ears, and broad flat front feet for digging. If one is captured uninjured, it is well worth while to watch it dig its way swiftly into the ground. Moles are not rodents, or gnawing animals, but feed upon earthworms and insect larvae.

MOLE CRICKET. See CRICKET.

MOLECULE. The smallest particle of any substance that retains the nature and identity of the substance is the molecule. Molecules are made up of atoms. The atoms, in turn, are composed of subatomic particles, such as electrons and protons.

In elementary substances, which consist of atoms of all of the same kind, a molecule and an atom can be the same. In most substances, however, the molecule is composed of at least two atoms. Water is chemically referred to as H_2O. This means that a molecule of water is made up of two atoms of hydrogen and one atom of oxygen. It is an example of a compound substance.

Even the largest molecules are so small that they cannot be seen with the naked eye. In fact, very few molecules have ever been seen and those only with the aid of the powerful electron microscope. Their size is difficult to imagine. It has been estimated that the average molecule is about a hundred millionth of an inch in diameter and that each breath of air we breathe, contains billions of molecules of gases.

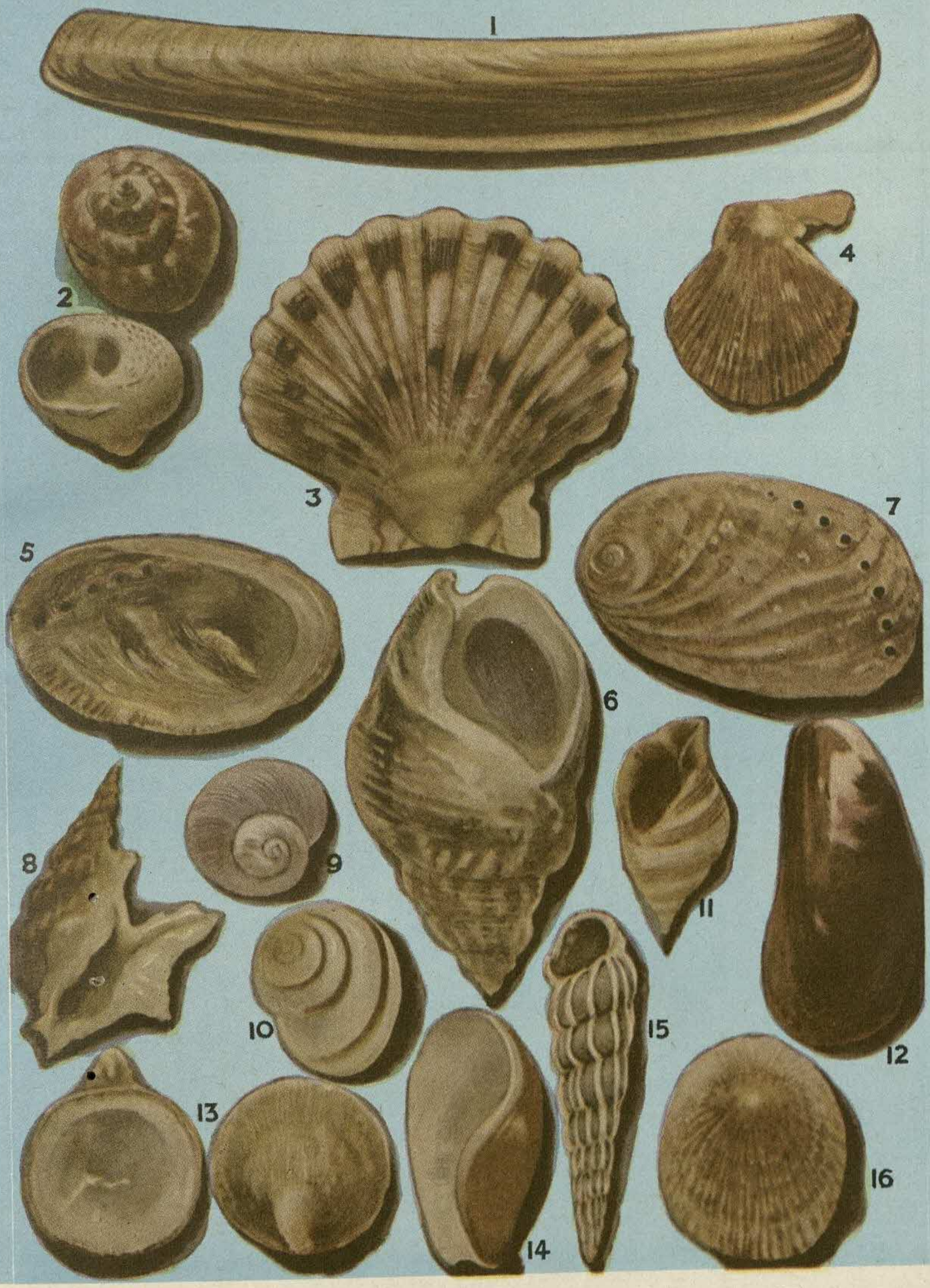
Molecular Forces unite atoms into molecules and regulate the relations of the molecules. This determines the nature of the substance — whether it will be a gas, a liquid, or a solid. Hydrogen and oxygen, separately, are not water, but gases. Combined in the proper amounts, though, they become the liquid.

Molecular Weights. If molecules are too small to be seen, how can they be weighed? The weight of a molecule is determined by a scientific law first formulated by the Italian scientist, Amadeo Avogadro, about 150 years ago. He discovered that two gases, if kept under the same temperature and pressure, possess the same number of molecules. Instead of weighing single molecules, large volumes of the two gases can be weighed under these fixed conditions, and their weights compared. The molecular weight of oxygen is taken as a standard. The atomic weight of oxygen is 16 but, since there are two atoms of oxygen in each molecule, the standard for comparison is 32. See also CHEMISTRY.

MOLIERE, *mo lyair'* (1622-1673), the stage name of a brilliant French dramatist who also acted in his own plays. He is considered second only to Shakespeare as a writer of comedy. Born Jean Baptiste Poquelin, he worked for a time at his father's trade as upholsterer but soon deserted this occupation for the stage. After a successful tour as an actor in *The Loving Spite* and *The Madcap,* he settled in Paris in 1658, where his plays and acting won him great favor at the court of Louis XIV.

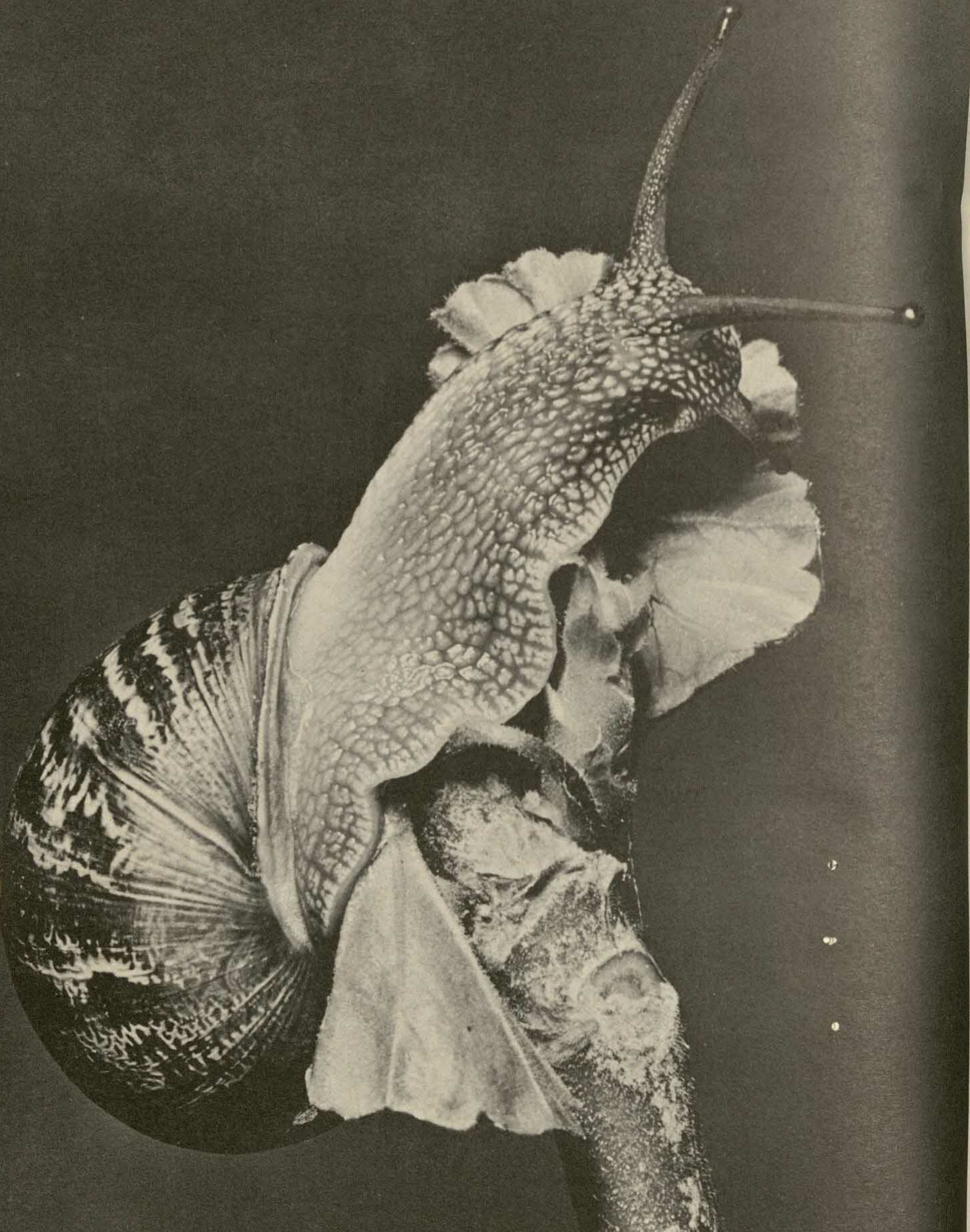
Molière's style was sharp and witty and his plays, though satirical and fanciful, pointed out many of the absurdities in the prevailing manners and customs of the period. Among his best known and finest works are *Tartuffe, The Misanthrope, The School for Husbands, The School of Wives, Physician in Spite of Himself, The Imaginary Invalid,* and *The Absurd Précieuses.*

MOLLUSCA, *mo lus' ka.* Snails, slugs, oysters, clams, scallops, squids, and other animals of their kinds have been placed in a single group by zoologists. These animals all have bodies that are not divided into segments. Most of them move about by a single footlike structure. The Mollusca, or



BEAUTIFUL ARCHITECTURE IN MARINE ANIMAL HOMES

Sea shells take all sorts of forms and colors; make decorative collections. (1) Razor shell. (2) Top and bottom of a painted-top shell. (3) The familiar great scallop. (4) Variegated scallop. (5) Ormer shell (inside). (6) Great whelk. (7) Ormer shell (outside). (8) Pelican's foot. (9) Purple shell. (10) Wood snail. (11) Dog whelk. (12) Mussel. (13) Hungarian bonnet (inside and out). (14) Boat shell. (15) Ladder shell. (16) Limpet.



H. S. Barsam

STRICTLY A VEGETARIAN

The common garden snail may be found in gardens, hedges, and woodlands. It has a tremendous appetite and is destructive to plant life. Its shell is banded in brown and yellow.

Virginia Chamber of Commerce

A MEATY, PEARLY MOLLUSK
Clams are a popular seafood, both fresh and canned, and the shells give mother-of-pearl.

mollusks, have no backbones and no jointed limbs. Many of them have simple forms of eyes. Every mollusk has a heart and blood circulatory system, an alimentary (digestive) canal, breathing apparatus, and a well-developed nervous system.

These animals move about in various ways. Some burrow, some swim, and some travel only because they attach themselves to some moving object, such as a fish or a ship. Most of them have shells. Those with a single cup-like spiral shell are called *univalves;* those with hinged double shells, such as oysters and clams, are called *bivalves.* The shells, usually with three layers, are often rough and drab on the outside, but inside they are smooth and lustrous like mother-of-pearl.

There are more than 60,000 species of mollusks. Most live in the water but some, such as the snails, slugs, and limpets, live on the land. They are called *gastropods,* meaning *stomach-footed,* because they seem to walk on their stomachs. Unlike the oyster and clam, they also have well-developed heads. Some mollusks, like the octopus, are terrifying and dangerous. Others are of commercial importance. The oyster gives us our pearls, and the pearly nacre of clam shells is used for buttons and other ornamentation. The clam, the scallop, and the oyster are important as foods and support a large part of the fishing industry. Tiny snails are used by everyone with a tropical fish aquarium to help keep the water clean.

For additional information consult:

Clam
Mussel
Oyster
Scallop
Slug
Snail

MOLTING. Birds do not always look the same. Sometimes they are bright-colored. Sometimes they are dull. These changes in color may be due to the wearing off of the ends of the feathers and resulting exposure of the differently colored parts below, or to the shedding of old feathers and the growth of new ones. The shedding of feathers is known as molting.

Birds shed their feathers at different times and in different ways. Most of our song birds are without visible plumage when first hatched. A down soon appears, however. This is followed by a set of nestling feathers which enable the bird to leave the nest and shift for itself. Usually this plumage is soon shed for the first winter plumage. The following spring it may or may not be shed, depending upon the species, but the following fall, after the birds have reared their young or after the breeding season, all birds shed their feathers. We are familiar with the molting of chickens in the poultry yard, and know that while their energy is being used to grow new feathers, they are unable to continue egg production.

Some birds shed only a feather now and then. In this way they are always able to take flight. Other birds may shed large numbers of feathers at once during a *molt*. If the flight feathers are lost, then the bird cannot fly until new feathers appear.

MOLUCCAS, *mo luk' az,* or **SPICE ISLANDS.** Between the Celebes and New Guinea in the Malay Archipelago lies this scattered group of islands, a part of the Indonesian Republic. Their chief products include mace, cloves, nutmeg, pepper, and other spices, sago, and copra. Mountainous and forested, with many active volcanoes, the islands cover about 32,000 square miles. Population, 560,000. See INDONESIA.

MOLYBDENUM, *mo lib' de num.* Unknown before 1778, this silvery metallic element has become increasingly important. First used in alloys of special steels for tools, boiler plates, rifle barrels, and propeller shafts, it is now also important as electrical contacts on spark plugs and X-ray tubes, in nonferrous alloys, for plating other metals, and in compounds used as lubricants and catalysts. The chief ores of molybdenum are molybdenite and wulfenite. The chemical symbol of molybdenum is Mo.

MOMENTUM. A moving body exerts a force when it is stopped. A flying stone may break a window, and a bullet may penetrate a steel plate. The force exerted by a moving body, when it is stopped, is due to its momentum. Momentum is sometimes described as a *quantity of motion,* and it is measured by the product of the mass of the moving body and its velocity.

When a moving body stops, it gives all its momentum to the body that stops it. Thus, a baseball gets exactly as much momentum as it takes from the bat.

MONACO, *mon' a ko.* Tucked in the extreme southeastern corner of France, on what is known as the Riviera, is the tiny principality of Monaco, so small that one could walk across it in an hour. It has an area of about 370 acres but, despite its small size, it has its own government. It is famous as the home of Monte Carlo, the world's greatest gambling center. The principality is divided into three communes, or towns: Monaco, the capital, La Condamine, and Monte Carlo. The population is about 20,000.

Monaco is on a rocky promontory that slopes down to a narrow strip of the Mediterranean coast. There are some forested areas but little agricultural land because the country is densely settled. The climate is mild with an average temperature of 50° F. The views of the Mediterranean and the mountains in the background are among the finest along the Riviera.

In 968 Monaco was given to a branch of the Italian House of Grimaldi, and is ruled by a hereditary prince. Until 1911 he had absolute power, but in that year a constitution was granted. The people are not taxed, for the country is supported by rents from the Monte Carlo gambling casinos.

MONARCHY. Executive authority in a monarchy is vested in one person by heredity. A monarchy differs from a republic in that the chief executive is elected by the people or their representatives.

There are two types of monarchy: *absolute,* in which the ruler is supreme; and *limited,* or *constitutional,* in which a parliament or a constitution may limit the ruler's authority. Great Britain is a limited monarchy. See GOVERNMENT.

MONAS'TICISM. Cloistered from the world, monks and nuns dedicate themselves to prayer, to learning, and to the service of their church. This consecration is the practice of monasticism which, in the Middle Ages, kept alive the learning of the ancients.

Monasteries existed in India, Greece, and Egypt long before the Christian era but the beginning of monasticism is usually dated from the hermits of the third century. At first, monks were hermits, such as Paul of Thebes and Saint Anthony, who lived in lonely places. Later Saint Pachomius founded a brotherhood of members living together in a monastery. Then monks were no longer solitaries, but *cenobites.*

In the fourth century monasteries spread rapidly through Europe, and Saints Basil, Jerome, Ambrose, Martin, and Augustine encouraged study and meditation among men of the Roman Catholic faith.

Saint Benedict, however, was the leader of monasticism as it is today. In the sixth century he founded many monasteries, some for women called nuns. His followers adopted a disciplinary code that exists today. Bodily comforts were foregone, and vows of poverty, chastity, and obedience were taken. In these monasteries, learning flourished during the Middle Ages. Later came the orders of monasteries and, in the twelfth century, the Crusaders founded the knightly orders that embraced monasticism. Mendicant orders, in which the members lived by begging, were started in the thirteenth century.

Although shunning the world, many monks rose high in some fields. Among them were Albertus Magnus, Thomas Aquinas, Duns Scotus, and Roger Bacon. The Jesuits were the last of the great orders to be founded (see JESUITS). In some countries monasticism has been curbed but where complete religious freedom prevails there are many priests, nuns, and brothers. See ABBEY; MIDDLE AGES; ROMAN CATHOLIC CHURCH.

MONDAY, *mun' di.* If we grant the truth of the old proverb—"Well begun is half done"—Monday is a very important day. Though it is the second day of the week, it is for most of us the first day of work. The name means *Moon-day.* In each of the countries of western Europe, the second day of the week has a name with a similar meaning.

MONET, *mo nay',* CLAUDE (1840-1926). When Claude Monet, brilliant French artist, painted and exhibited his canvas *Impression: Rising Sun,* he founded a new school of painting and raised a storm of criticism in art circles which has not yet subsided. The school which is now known as the Impressionist follows Monet's belief that an artist should paint only his "first impression" of a scene, and should emphasize brilliant coloring, light and shade, and perspective, rather than form. Born and educated in Paris, Monet now ranks as one of the leading artists of the modern period. Among his other important canvases are *Fontainebleau Forest, Waterloo Bridge, The Sun in a Fog, Rouen Cathedral,* and *Views of the Thames.* See PAINTING.

MONEY. Anything which is used as a convenient medium in the exchange of goods among people may be called money. Today we usually think of money as being coins or printed paper bills, with which we can purchase almost anything that meets our fancy. However, money has not always existed in these forms. In fact, even now in some places, money is not thought of as government-coined metals. At various times among various peoples, beads, leather, iron, copper, cattle, and many other articles have been acceptable mediums of exchange—things that people were willing to give for goods they desired, and which they were willing to accept from others in payment for goods they had.

As long as man lived in a primitive state and lived only within his own family, gathered his own food, made his own clothes, and built his own shelter, there was no need for money. But when men began to live in communities, the divisions of labor replaced the all-inclusive family life.

But how was the shoemaker going to obtain fresh bread daily from the baker? Certainly two shoes were worth more than a supply of bread, and perhaps the baker would not be in need of shoes. A part of a shoe, of course, could not be given, and it was too difficult to find someone who wanted shoes and was willing to give in exchange something the baker needed. The only thing to do was find something that almost everyone would be willing to take in exchange for his wares. Even then, it was thousands of years after organized trade began before people started using simple objects for money.

It was common in the early days of Greece to hear that a table was worth ten or twelve oxen, or in early England to hear values spoken of in terms of iron bars. The difficulty with these systems lay

How to Make Change in Britain

Although most governments mint coins and issue bank notes, the value and appearance of the coins and bills vary from country to country. The British coins pictured are compared with coins of the United States.

A PENNY is worth about one cent in U.S. currency, but it is about twice as big.

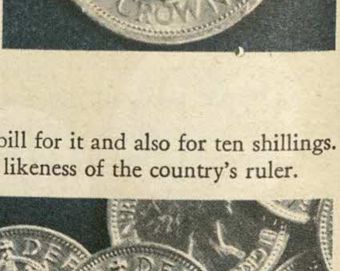
SIXPENCE. The silver sixpence is a small coin equal to seven cents. Its slang name is "tanner."

SHILLING. It is equal to 14 cents. Twenty-one shillings make a "guinea."

FLORIN. A two-shilling piece, or 28 cents. The first were minted during the reign of Queen Victoria.

The British Travel Association

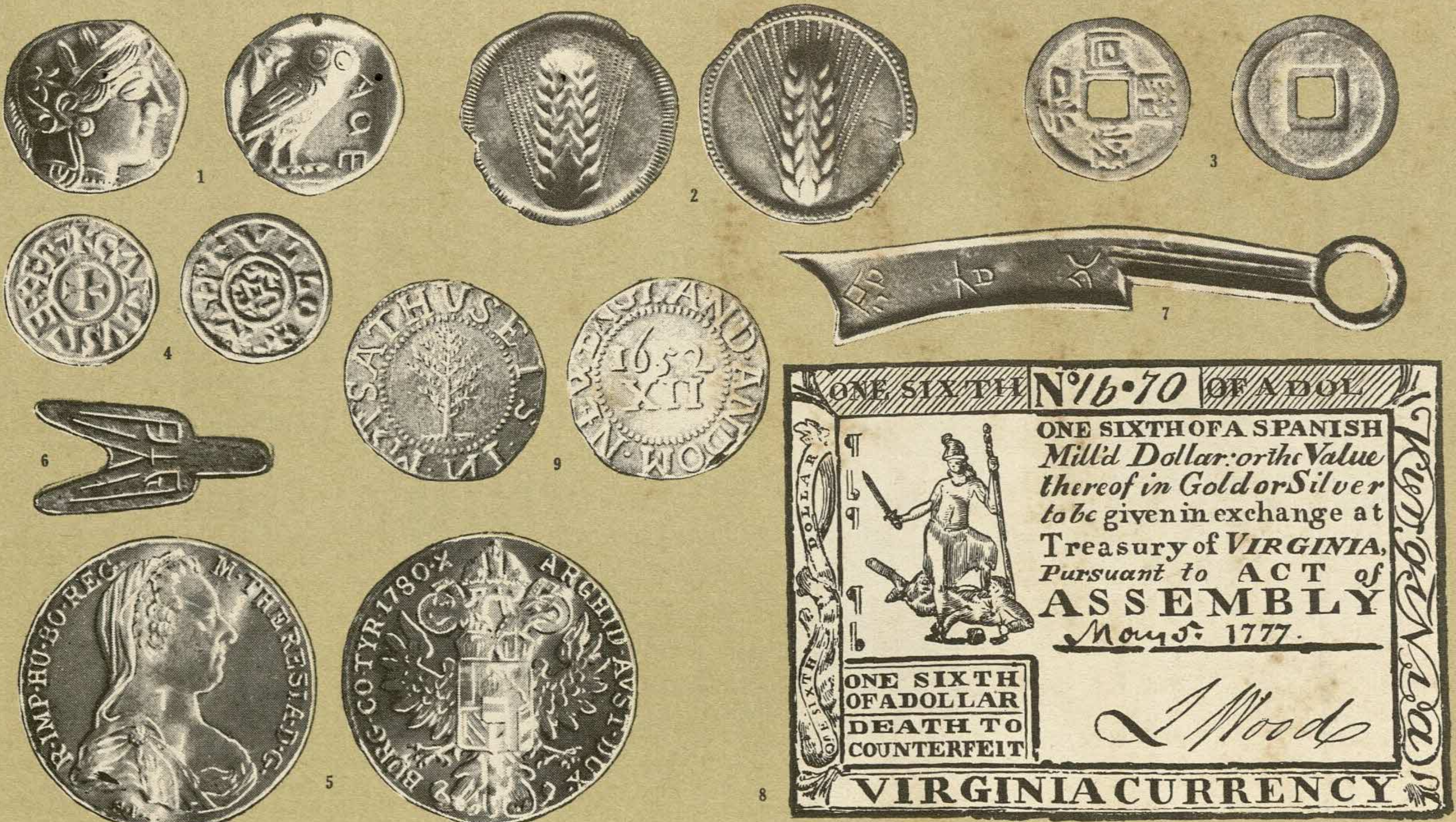
HALF-CROWN. Two shillings and sixpence, worth thirty-five cents. It also is equal to a florin and a sixpence.



TWENTY SHILLINGS ARE EQUAL TO ONE POUND

The Pound is worth about two dollars and eighty cents. There is a bill for it and also for ten shillings.

The reverse side of these coins varies the most. The face bears a likeness of the country's ruler.


1
2
3
4
7
6
9
5
8
ONE SIXTH No 16·70 OF A DOL
ONE SIXTH OF A SPANISH Mill'd Dollar: or the Value thereof in Gold or Silver to be given in exchange at Treasury of VIRGINIA, Pursuant to ACT of ASSEMBLY May 5th 1777.
ONE SIXTH OF A DOLLAR DEATH TO COUNTERFEIT
J Wood
VIRGINIA CURRENCY
VIRGINIA
ONE SIXTH DOLLAR

HISTORIC LEGAL TENDER . . . Old coins preserve old dates, old portraits. (1) Athens silver, 560 B. C. (2) Greek "barley" coin. (3) Japanese cash, 700 A. D. (4) Charlemagne's denier. (5) Maria Theresa dollar. (6) China cloth coin and (7) knife money. (8) Early American bill. (9) Pine-tree shilling.

in their instability. To buy a table in ancient Greece, a person had to drive a dozen oxen to market. Then, also, there was the consideration that when oxen became too numerous, they were not wanted; if they could not be used for transactions, they would eat up part of their value in food. No one likes to have his money lose its value before it can be spent, and livestock are troublesome to transport. The best money is convenient to use and is based on something which is not likely to become too common.

Gradually it became evident that metals would make the best money. Iron and copper were used as long as they were scarce; and finally gold and silver, because they were recognized as valuable by almost everyone. Gold and silver had beauty and durability, and were scarce enough so that small amounts were sufficient to answer the needs of most people. In other words, they made a convenient form of money. Coins came into use when people and governments found that by weighing a quantity of the metal and stamping the value on its face, it could be used over and over.

Standards of Money. Of metals now used in coins, gold is the most valuable, and from that standpoint makes the best money; but it does not stand wear as well as silver and, when used at the same time as silver, is likely to be hoarded and disappear from circulation (see GRESHAM'S LAW). For this reason, many countries that have used gold as the standard of their money have kept the gold in their treasury to make the monetary system of the government secure.

For common use, paper currency and coins of silver and baser metals are placed in circulation. Actually, the value of these monies is not in their intrinsic worth, but in that stamped on their face. In the United States, a silver dollar contains much less than a dollar's worth of silver. While people trust their government they will accept the value stamped on the coins. A government can maintain its financial stability and the confidence of its people only so long as it has sufficient *good* money in its treasury to back that in circulation. As soon as it fails to do so, the purchasing power of money fluctuates and the circulating medium becomes known as *fiat* money.

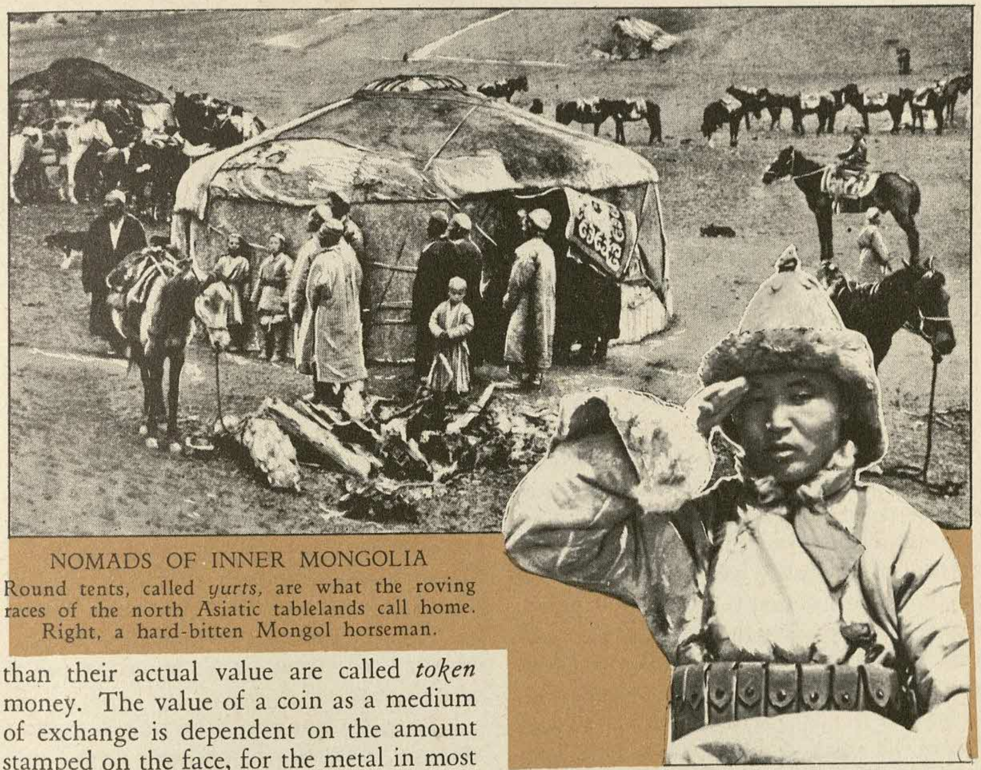
In theory, in a country which has adopted the gold standard, silver coins or paper bills are exchangeable, on demand, for gold coins of the same value.

In countries where two standards of money, gold and silver, have been maintained, the values of the metals have been made dependent on each other. For example, gold might be declared sixteen times as valuable as silver, and so whatever the value of one ounce of gold might be, one ounce of silver would be worth one sixteenth as much. Such a standard is commonly called *bimetallism*.

Money in the United States. The United States was on a bimetallic basis from 1792 to 1873. In the latter year, Congress passed a coinage act making the gold dollar of 25.8 grains, nine tenths fine, the unit of value, and the country was legally on the gold standard in 1879, when specie payments were resumed. Not until 1900, however, was the gold standard specifically established by act of Congress. The value of gold was set at $20.67 an ounce.

Until the depression years, the major countries of the world were also on the gold standard. About 1930, owing to the economic upheaval, the centralizing of gold in a few countries, and the general fear which caused people to hoard gold, many countries refused to redeem their circulating money in gold. The United States abandoned the gold standard in 1933. In 1934 Congress nationalized all gold supplies, and the President, by congressional authority, devalued the gold dollar to 15-5/21 grains, making an ounce of gold worth $35. The dollar itself was worth 59.06 cents. To secure its financial stability, however, the United States bought up large quantities of gold, holding it in reserve in uncoined, or *bullion*, form.

Coins having a redeemable value greater



NOMADS OF INNER MONGOLIA

Round tents, called *yurts,* are what the roving races of the north Asiatic tablelands call home. Right, a hard-bitten Mongol horseman.

than their actual value are called *token* money. The value of a coin as a medium of exchange is dependent on the amount stamped on the face, for the metal in most coins is worth considerably less than the face value. In a broad sense, paper money is classified as token money.

Legal Tender. According to law, the money of a country must be accepted by one person from another in payment of debts (unless otherwise agreed beforehand). A tender of money for payment is called legal tender. There are limitations as to the legal tender of money in the United States. Silver dollars and Treasury notes are legal tender for any amount; subsidiary silver coins are legal tender for amounts up to ten dollars; and the nickel and penny are legal tender up to twenty-five cents. Over these amounts, the receiver may demand higher denominations of token money in payment of debts.

Paper Money. Coins in large quantities are too heavy to carry around on one's person. The use of paper money, as a substitute for coins, makes it comparatively simple for a person to carry large sums without inconvenience.

For additional information, consult the following articles:

- Banks and Banking
- Coins and Coinage
- Fiat Money
- Mint

MONEY ORDER. By the use of a money order, issued by offices of the United States Post Office Department, money may be sent safely through the mails. The fees are paid by the sender, are very small, and vary in accordance with the amount being sent. No single money order can be issued for a sum over $100, but the same person may buy as many orders in one day as he desires. Within thirty days any money-order post office in the United States (with the exception of a few in Alaska) will redeem the order; after that, only the office of destination. Money orders can be transferred only once by endorsement, and must be presented for payment within a year.

MONGO'LIA. Formerly Mongolia was an important part of the great Chinese Empire, but today it is divided into Inner

Mongolia and Outer Mongolia, the two separated by the great Gobi Desert (see Gobi). The former, controlled by Japan from 1937 to 1945, is part of the Chinese Republic; the latter is a Russian satellite. Mongolia lies to the west of Manchuria and is nestled against the southern border of Siberia. Its total area is about 957,000 square miles; its total population is estimated at about 7,000,000. The leading occupation is grazing.

Inner Mongolia. The Chinese provinces comprising Inner Mongolia cover an area of some 334,000 square miles and have a population variously estimated at between five and seven million. Inner Mongolia is more densely populated than Outer Mongolia, to the north of it.

Outer Mongolia. This division extends northward from the Gobi Desert to Siberia. In 1924, revolutionaries set up a republic there, modeled after the Soviet Union and very much under the influence of that government. However, Outer Mongolia continued to be considered a part of China until October, 1945, when the people voted for independent status. The area is about 623,000 square miles and the population about 850,000.

MONGOLIAN RACE, or YELLOW RACE. See Races of Men.

MON'GOLS. Unimportant in the world today, the Mongols once were the most powerful people in Asia. They are the typical representatives of the Mongolian, or yellow, race. Originally they were a nomadic people whose homes were tents. They traveled about from place to place wherever they could find pasturage for their flocks.

These Mongols were great horsemen and powerful fighters. By the thirteenth century they had subdued the people of vast areas in Asia and Eastern Europe. That was the time of Genghis Khan, who united the Mongol tribes, conquered China, and extended his rule to Southern Russia. His successor swept over other parts of Asia, as well as Russia, Poland, and Hungary. The great Kublai Khan became emperor of China and founded a dynasty which lasted until 1368.

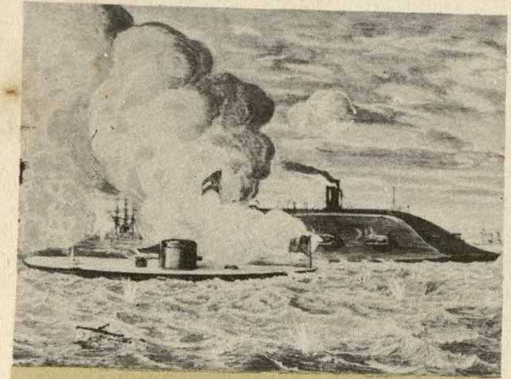
With the founding of the Ming Dynasty in China, the Mongols were gradually driven back into their original territory. They split up into smaller and smaller divisions and finally, when the Manchu emperors of China came to power, were entirely subdued.

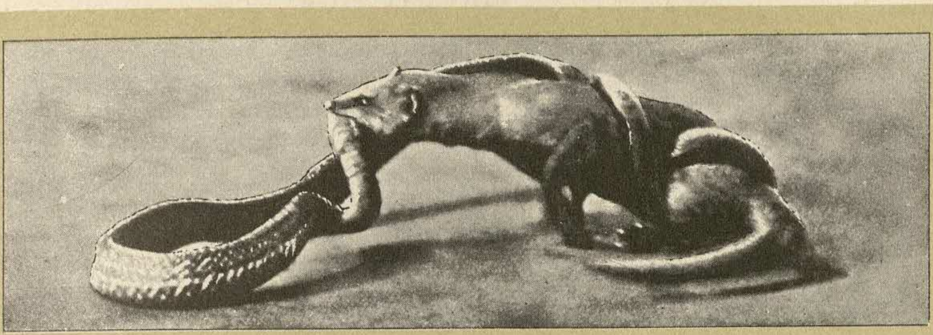
Late in the fourteenth century, however, another Mongol, Tamerlane, arose and conquered a large portion of Southern and Western Asia and Asia Minor.

By the sixteenth century, the Mongols were but a minor factor in Asia and were under the rule of other people. Today the remnant of their sweeping empire is Outer Mongolia, a remote, mysterious land. By reason of their former conquests, however, they are spread throughout Asia and are not confined to the area known as Mongolia. See China; Genghis Khan; Kublai Khan; Mongolia.

MON'GOOSE, or MUN'GOOSE. Used in India to kill rats and other animal pests, the mongoose is a small brownish-gray animal capable of killing the most deadly of snakes without harm to itself. It has been introduced into Europe to exterminate pests, but it frequently preys also on small domestic animals and poultry. Its importation into the United States is forbidden.

MON'ITOR AND MER'RIMAC. The doom of the wooden warship was sounded on March 9, 1862, off Hampton Roads,


THE MONITOR AND THE MERRIMAC
Making history at Hampton Roads.



AGILE COBRA KILLER OF INDIA

The mongoose is so quick and fearless that he is able to dodge the cobra's lunge and seize it by the neck before it can recoil.

Va., in a memorable battle of the American Civil War. This was the battle between the *Monitor,* a metal ship described as a "cheesebox on a raft," and the *Merrimac,* a rebuilt wooden ship with a peaked metal covering sloping from the deck.

The *Merrimac,* a Confederate ship, had been defeating Union warships in Chesapeake Bay. On March 8 the *Monitor* was sent to challenge it, and the following day the battle ensued. The *Monitor,* with its low deck and revolving turret for guns, was difficult to hit; and after four hours the two vessels withdrew. Neither boat figured thereafter in the war, but they did prove that wooden ships were useless in modern warfare. The *Monitor* sank in a windstorm a few months after the battle; the *Merrimac* was sunk by its crew to prevent its capture. See CIVIL WAR IN AMERICA.

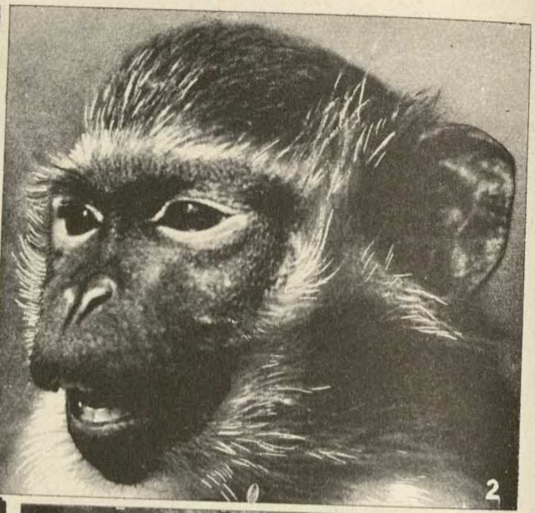
MONK. See MONASTICISM.

MONKEY, *mun'ki.* In a broad sense the name monkey is given to any of the mammals which somewhat resemble human beings. More strictly, however, the larger forms without tails are properly called *apes* (see APE), while the term monkey applies to the smaller, long-tailed, narrow-faced kinds. Monkeys are found in both the Old World and the New World, but do not occur in North America north of Mexico. Those seen in the United States and Canada are invariably in captivity, either in menageries or zoological gardens, or as performing animals in the possession of wandering organ grinders. Our expression "to monkey with things' has resulted from the well-known mischievous habits which most monkeys seem to have.

FOUR "HANDS" TO KEEP BUSY

This adult, male proboscis monkey of Borneo has a nose so long that it hangs down over his lip. He is a leaf eater; kin to the langur.

1



2

3

4

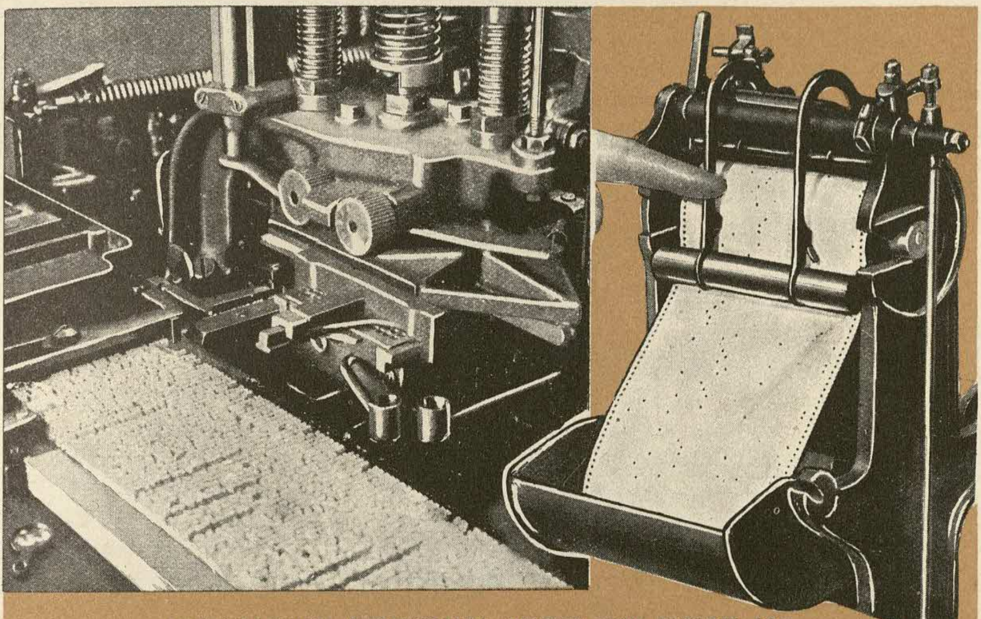
NOISY FOREST FOLK

Chattering, mischievous monkeys are among the most popular and interesting of pets. (1) An African guereza. (2) A long-tailed dandy. (3) The young, white mangabey. (4) A sage marmoset.

The monkeys of the New World are usually smaller than those of the Old. They live in the forested regions of South and Central America and spend most of their time in the trees, where they feed upon fruits or play among the branches. Most of these monkeys use their tails to hang to branches, and in this respect differ from those of the Old World. Their nostrils are placed farther apart and they have no cheek pouches which they can stuff full of food.

The monkeys of the Old World have shorter tails, if they have any, and do not use their tails for grasping. Many species live on the ground, and many of them have cheek pouches which they may stuff full of food in much the same manner as chipmunks. The Old World monkeys have thirty-two teeth, while those inhabiting the Western Hemisphere have thirty-six.

MONOP'OLY. When a person or company is able to gain exclusive operation in a market, such an individual or firm enjoys a monopoly. A monopoly in industry may



CLEAN-LINED, INDIVIDUAL TYPES FOR EVERY JOB

The ingenious monotype casts bright, new types in somewhat the same manner that a player piano produces notes from a paper roll. Invented by Lanston, it came into use in 1897.

be achieved by an aggregation of capital, or it may be brought about by legislative enactment. The first type may be benevolent in its purposes, but there are no reasons why it should become so; it is more likely to become oppressive, unless in time placed under control. The second is nearly always beneficial to those whom it serves, for it is easily held within certain legal bounds.

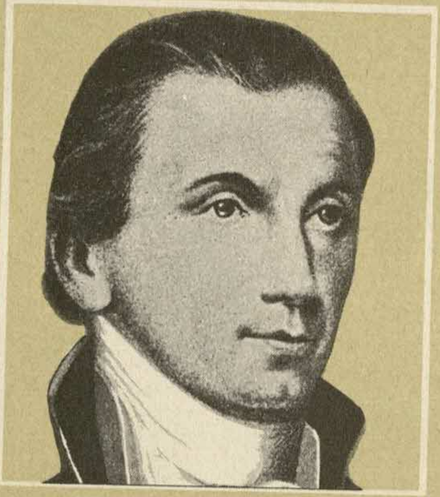
A great deal of money employed for the single purpose might purchase all the salt blocks of a nation, or the majority of producing oil wells, or effect a combination of woolen mills. Having acquired ownership, and with it control of distribution, the monopoly might cause a forced increase of prices, to exact a greater profit. Or, temporarily, a monopoly could use its power to lower prices to such ruinous levels as to destroy competition. Those enterprises whose operations are interstate come within the control of the Federal government, and Congress has placed on the statute books, laws designed to deal effectively with attempts to create national monopolies.

The second kind of monopoly referred to is known as a *natural* monopoly. It is not to the public interest to permit two telephone companies to exist in a community; such duplication of service is troublesome and increases the expense to users. Having more than one electricity-supplying company may also result in poorer service and a greater cost for the people of a city. When one public-service company is able to extend its advantages to all the people, it is usual for the authorities to exclude all others from the field and throw such restrictions about the single unit of service as will effectively safeguard the interests of the community. See Public Utilities; Trusts.

MON'OTYPE. In printing, this type of machine casts type as individual letters. It may be contrasted with the linotype, which sets a complete line on one lead *slug*.

The apparatus is very complex and the machines require skilled operators, but their value lies in the fact that corrections can be made without the resetting of a whole line, and better spacing can be secured between letters and words. A constant supply of new type for hand setting can also be made on the casting machine. Although the monotype is slower than the linotype because of the two separate processes involved, it is preferable for certain types of work.

There are two distinct sections of the monotype machine. One section is composed of the keyboard, which perforates a paper tape. The other is the type-casting and -setting apparatus. The perforated tape, which resembles a roll for a player piano, is unrolled over the frame holding the matrices (type molds). The perforations on the tape correspond to the type characters of the text, and bring about the casting of letters by raising and depressing a series of plugs necessary to bring the proper matrix under the casting section of the machine. As soon as the type is cast, it is shoved out into a galley frame, in proper order for printing. See LINOTYPE; TYPE.



JAMES MONROE
Fifth President of the United States
Administration, 1817-1825
President during the "era of good feeling," Monroe was a staunch Jeffersonian. His administration saw the Florida purchase, the adoption of the Missouri Compromise, the start of Western migration.

MONROE, *mun ro′,* JAMES (1758-1831). When the "last of the Virginia dynasty," as James Monroe was called, assumed the Presidency of the United States, he came well prepared by long years of practical experience for the task which lay before him. He had breathed the air of liberty and independence as a soldier in the Revolutionary War. As a colleague of Thomas Jefferson, he learned the art of statecraft and the philosophy of democratic government—leaning toward the doctrine of states' rights. And as ambassador and as Secretary of State under Madison, he was familiar with America's place in the sphere of nations. It is significant that America gained added national prestige under his two administrations as President.

Fortunately for the career of the fifth President, the War of 1812 was finished and political controversies were at low ebb, with only one party, the Anti-Federalist (Democratic-Republican), exerting any influence. The state of the nation was such that historians often refer to the period as "the era of good feeling." What James Monroe had to contribute he did mainly as an executive. However, the Monroe Doctrine, which he announced, stands today as a monument to his foresight.

Early Career. Of fairly well-to-do parents, of Scotch and Welsh descent, James Monroe was born in Westmoreland County, Va., on April 28, 1758. When the lad was sixteen, he was sent to William and Mary College, but he joined the army on the outbreak of the Revolution, and as a lieutenant in a Virginia regiment saw active service, being wounded at the Battle of Trenton.

Monroe began his public career in 1782, when he was elected to the Virginia assembly. The next year he was sent to the Continental Congress, where, as an opponent of a strong central government, he sat until 1786. In 1788 he was a leader in opposing the adoption of the Federal Constitution by the Virginia convention, and as an Anti-Federalist was elected to the first Senate under the new Constitution.

Washington's respect for his political opponent was shown when Monroe was sent to France as minister in 1794, but he retained that position for only two years, being recalled by the President because of indiscretion and tactless public utterances. Supported by his party, Monroe attacked Washington's action in a document entitled *View of the Conduct of the Executive.*

Monroe was governor of Virginia for one term, and in 1802 was sent by his friend, Thomas Jefferson, then President, to aid Robert R. Livingston in negotiating for the purchase of land near the mouth of the Mississippi. The result of this mission was the Louisiana Purchase of 1803. Remaining in the diplomatic service, Monroe was ordered to England and Spain, but, although he attempted to negotiate important treaties with these nations, little came of his efforts.

Still popular as an Anti-Federalist, on his return home Monroe was again elected to the Virginia assembly, and in 1811 for a second time became governor. This office was relinquished in favor of that of Secretary of State under President Madison. For two years, 1814 and 1815, Monroe had temporary charge of the War Department, the affairs of which he admirably conducted during the closing years of the war with England. It was comparatively easy for him to defeat Rufus King, the Federalist candidate for President, in the election of 1816.

The Administrations of Monroe (1817-1825). Despite the era of good feeling, grave economic problems were slowly shaping themselves in this period. By 1819, the United States was in the midst of a severe depression—an aftermath of the disturbance to trade and manufacturing caused by the War of 1812. Henry Clay and a few supporters urged Congress to appropriate money for public improvements (highways and canals), but the President held that such appropriations were not within Federal jurisdiction. This group of men, disagreeing with Monroe on the public-works issue, formed a new party, known as the National Republican, during the next administration (see ADAMS, JOHN QUINCY). Of interest, also, is the fact that before Monroe left office in 1825, one of his last acts was to sign a bill providing for surveys of national canals. Not that his opinions had changed, but he felt that public opinion was strong enough to warrant his approval.

For the first time since the writing of the Constitution, the question of slavery assumed national importance. When Missouri and Maine applied for statehood at about the same time, the South demanded that Missouri be admitted as a slave state to preserve the balance between free and slave states. The outcome was the famous Missouri Compromise of 1820, which prohibited slavery north of latitude 36°30′.

As Monroe's first administration drew to a close, trouble arose with the Seminole Indians in Florida. Andrew Jackson was sent to quell the Indians, and, in so doing, he caused the death of two Englishmen. Fortunately, trouble with England was averted, and by diplomatic maneuverings, Secretary of State John Quincy Adams negotiated the purchase of Florida from Spain in 1819.

In the election of 1820, Monroe received all electoral votes but one, that one going to John Quincy Adams. In his message to Congress in 1822, Monroe suggested that the independence of republics in South America be recognized. At this time the Holy Alliance in Europe was becoming formidable, and in the following year Monroe made his memorable declaration to Congress concerning European influence in the New World. To John Quincy Adams should go the credit for formulating the doctrine, but Monroe assumed the responsibility for it, and in this manner became associated with it.

Ever since the passage of the protective tariff in Madison's administration, the tide of opinion had been running in favor of protection. As a part of what he called "The American System," Henry Clay advocated a high protective tariff to encourage home industries and make the United States in most respects self-sufficient. In 1824 a new tariff was passed, increasing duties on wool and other goods of the Central and Western states.

During this time the young nation was expanding westward, and a new and prosperous fur industry, under such men as John Jacob Astor, was developing.

John Quincy Adams became President in 1825, and Monroe spent the remainder of his life either on his estate at Oak Hill, Va., or in New York City.

For additional information, consult the following articles:

Clay, Henry
Holy Alliance
Missouri Compromise
Monroe Doctrine
Tariff
War of 1812

MONROE DOCTRINE. In 1823 President Monroe declared that "the American continents, by the free and independent condition which they have assumed and maintain, are henceforth not to be considered as subjects for future colonization by any European powers." This declaration to restrain all European interference in the political affairs of independent American nations is part of a policy known as the Monroe Doctrine. It has remained an integral part of American foreign policy.

Monroe issued his memorable statement at a time when it was rumored that the Holy Alliance, sponsored by Russia, Austria, and Prussia, sought to restore to Spain her lost colonies in America. The Monroe Doctrine further states:

"With the existing colonies or dependencies of any European power we have not interfered and shall not interfere. But with the governments who have declared their independence and maintained it, and whose independence we have acknowledged, we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition toward the United States."

In 1825 the doctrine prevented Spain from transferring Cuba to either France or England; but its interpretation was modified in the signing of the Clayton-Bulwer Treaty of 1850, in which England and America agreed not to occupy, fortify, or colonize any part of Central America, but jointly agreed to make secure a proposed canal across the Isthmus of Panama.

The strength of the policy was demonstrated after the American Civil War. During the war, France had made Maximilian emperor of Mexico. Secretary of State Seward issued a warning; American troops moved toward the border, and the French forces withdrew.

One of the most important incidents involving the Monroe Doctrine was the British-Venezuela dispute over the boundary between British Guiana and Venezuela. President Cleveland, broadly interpreting the doctrine, led the two countries to arbitrate their difficulty. Later, when several small Latin-American countries were torn by internal strife, the United States used the Doctrine to justify its armed intervention into their domestic affairs. Resentful, Latin Americans generally felt that the Doctrine was merely an instrument for guaranteeing the policy called "dollar diplomacy" — the commercial exploitation of Latin America by United States capitalists.

Pan-American Congresses and the withdrawal of American troops from Latin America improved relations. It was, however, the Good Neighbor Policy, adopted by President Franklin Roosevelt in 1933, that brought the American nations closer together than ever before, for it proved the United States wished to co-operate with, rather than to dominate, its neighbors The signing of a series of reciprocal-trade treaties between the United States and its neighbors also helped to convince Latin Americans that the United States really wanted to work with them. During World War II, most of the Latin-American nations not only followed the United States in declaring war against the Axis powers, but also joined it in making the world

Glacier National Park

MONTANA'S MATCHLESS SCENERY—UNSPOILED BY MAN
St. Mary's Lake in Glacier National Park mirrors the jagged beauty of Goat Mountain.

understand that the defense of the Western Hemisphere was the right and duty of all the American nations working together. See PAN-AMERICAN CONGRESS; PAN AMERICAN UNION.

MONSOON'. A steady wind that changes with the seasons is called a monsoon. The outstanding example of a monsoon is that which blows over Southern and Southeastern Asia. During the summer months it blows from the south and west and, being laden with moisture, brings heavy rainfall. During the winter the monsoon comes from the northeast, and it is then dry. The reason is that in summer the air over the land becomes hot and consequently rises. It is then displaced by the air over the sea. In winter, sea air rises, and the land air rushes outward to take its place. Monsoons, occurring in most tropical regions, were of great benefit to navigation in the days of sailing ships.

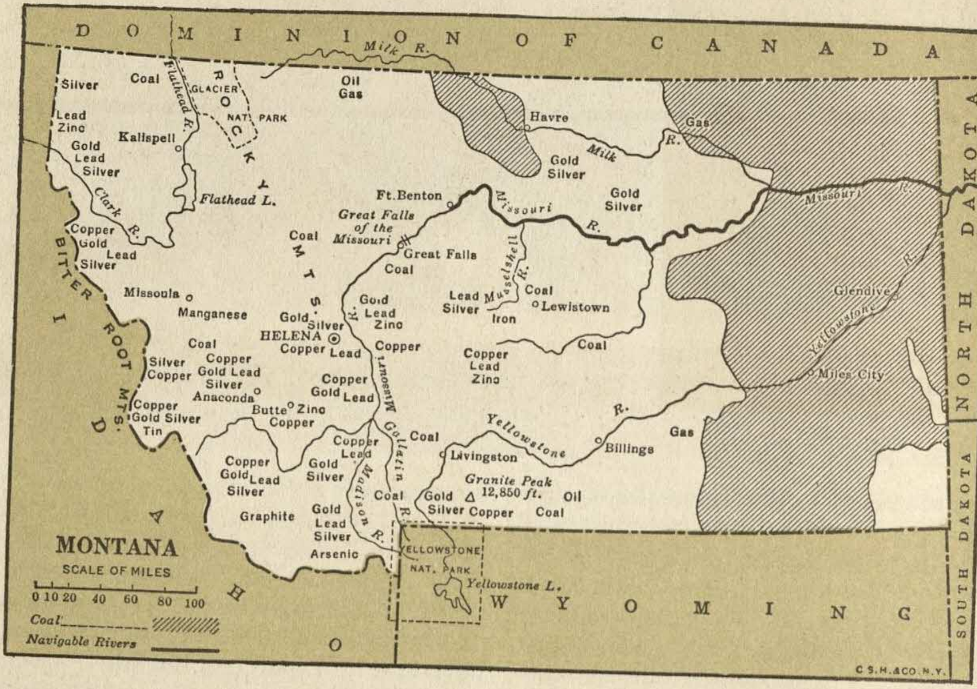
MONTAIGNE, *mon tane',* MICHEL EYQUEM DE (1533-1592). A brilliant French writer who originated a new style in essay writing, Montaigne has an important place among the world's literary figures. His most famous writings are his *Essays,* in which he touches upon a great variety of subjects, writing in a delightfully entertaining way.

Born at the Castle of Montaigne near Bordeaux, the author received a good education and began to write at an early age. He was made a parliamentary counselor in 1557, and served in that position for some years. In 1571 he retired to his country home for study and writing, leaving it only for occasional trips to Paris, Germany, and Switzerland for his health. His essays have been translated into English.

MONTANA, *mon tan'nah.* Not without reason is Montana called "the Treasure State," for here, in addition to mountains and rivers unsurpassed for beauty, are some of the greatest mineral deposits in the world. Copper, lead, gold, silver, and zinc are found in abundance, and Montana is one of the leaders in the United States in their production. Here also are rich farm lands, which, with the aid of irrigation, produce bountiful crops.

With an area of 147,138 square miles, Montana is one of the largest states in the Union. It is bounded on the north by Canada. To the east lie the Dakotas; to the south is Wyoming; to the south and west is Idaho. The population is about 775,000. The chief cities include Great Falls, Butte, Billings, Missoula, and Helena.

The Land and Its Waters. The surface of Montana has two general divisions. The western third of the state is mountainous; the eastern two thirds constitutes the Great Plains, rolling prairies gradually rising to the foothills of the mountains. The main range of the Rocky Mountains crosses Montana, as do a number of secondary



THE FOURTH LARGEST STATE IS A TREASURY OF MINERALS

ranges. West of the Rockies is the Bitter Root Range. A great basin lies between these ranges, crossed by several lesser mountains.

The mountain region is noted for its beauty and grandeur. Here are several well-known peaks, some rising as high as 12,000 feet. The mountains are covered with forests and several of them have glaciers. In the northwestern part of the state is one of the great wonders of North America, Glacier National Park. There are several other outstanding regions which are visited by thousands of tourists each year.

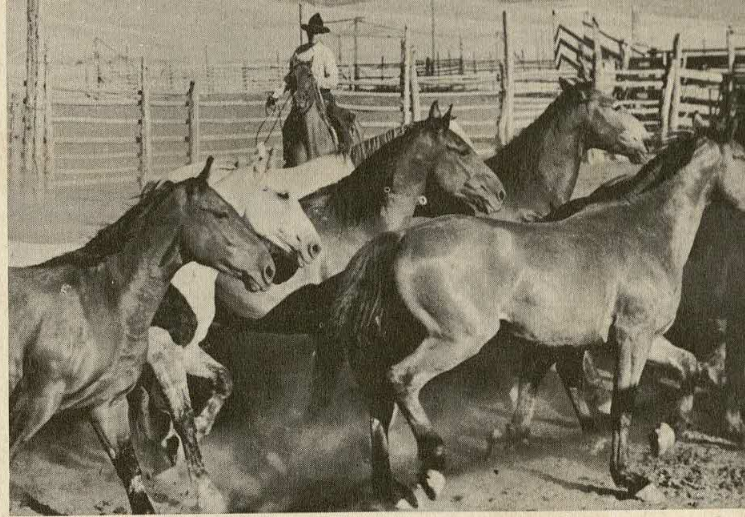
The Missouri River is the largest in the state and drains all the region east of the mountains. Second in importance is the Yellowstone River, the Missouri's chief tributary. Many streams rising in the mountains provide water for irrigation. The region west of the mountains is drained by the Clark and other rivers, which flow into the Columbia. Both the Missouri and the Yellowstone are navigable through parts of their courses in Montana. There are a number of lakes in the state, the largest of which is Flathead Lake.

Climate. Montana has extremes of temperature. The winters are cold, and the summers are usually hot. However, the discomfort which these extremes of temperature cause is lessened by the low humidity of the atmosphere. The average rainfall varies from twelve to twenty inches; although most of it falls during the summer months, some regions find it necessary to irrigate the land in order to raise crops.

Natural Resources. Montana is one of the leading mineral-producing states in the Union. Although many of the deposits have already yielded enormous wealth in gold and other valuable minerals, production in most of the important mining centers is still carried on at a maximum rate. The greatest mineral resource is copper, found chiefly around the cities of Butte

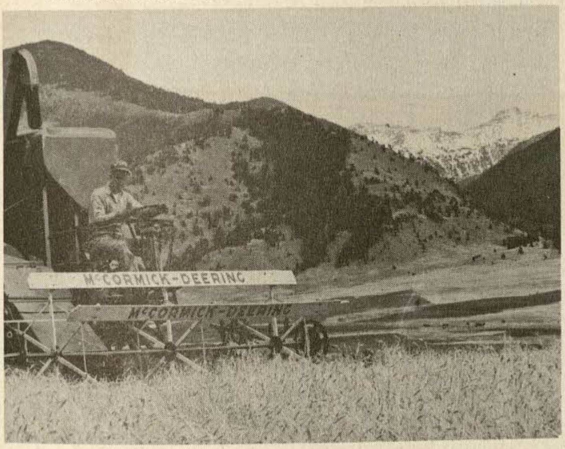
ALL IN A DAY'S WORK

A ranch hand selects horses for the next day's pack trip, a familiar scene at Montana "dude" ranches, right. Below left, combines such as this one-man, self-propelled, twelve-foot giant speed the wheat harvest in Montana, third largest wheat-growing state. Operator sits above cutting and feeding mechanism, which must be closely watched. Below right, market-bound cattle from Montana ranges are loaded into stock cars at Cascade, Montana.

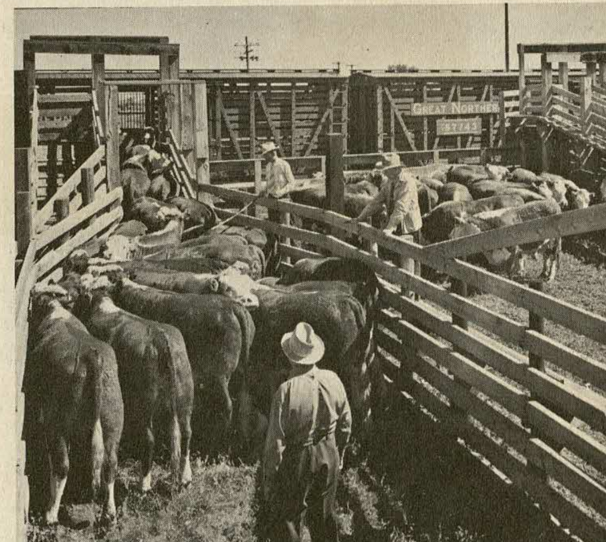


Chicago, Milwaukee, St. Paul & Pacific R.R.

International Harvester Co.



Great Northern Railway



and Anaconda. Montana ranks with the leaders in the production of copper. Butte is the center of one of the greatest copper-mining sections in the world. Montana also has supplies of coal, gold, silver, manganese, lead, zinc, petroleum, natural gas, and precious stones. Sapphires are the most numerous of the precious stones.

The state has valuable lumber-producing areas, a large part of which is included within Federal forest reserves. The leading timbers are Douglas fir, lodgepole pine, larch, and yellow and white pine.

Farming in Montana. Although only about one third of the total land area of Montana is in farms, agriculture is the leading industry. Because of the extensive pasture lands, large farms are devoted to the raising of livestock. Many areas which were formerly dry have been brought under cultivation by extensive irrigation. In mountain valleys in the western part of the state, where the rainfall is adequate, farm crops are raised in abundance. The most important crops are corn, spring and winter wheat, hay, oats, potatoes, barley, and flax. Here also are numerous fruit orchards.

Manufacturing and Transportation. Manufacturing in Montana is based largely on the agricultural and mining products. The largest industry, of course, is the smelting and refining of the various ores found in the state. This industry centers in Butte, but there are also important smelters at Anaconda, Great Falls, and

The Anaconda Co.

MONTANA COPPER IN THE RAW
Miners drill into an ore face before blasting.

Helena. Other industries include the fabricating of metals, lumbering, sawmilling, meat packing, flour and grist milling, fruit and vegetable canning, cement making, and the refining of beet sugar and of petroleum. Dude ranching and otherwise caring for vacationists also are important.

The state has a well-developed railroad system. Its fine highway system includes several scenic mountain roads that are outstanding feats of engineering. Montana also has excellent air service. Great Falls, a leading military air center during and after World War II, is an important air terminal for Alaska.

Government and Education. Members of the state senate are popularly elected to terms of four years, while those of the house of representatives are elected to two-year terms. The state supreme court heads the judicial system. The governor and other officers of the state are elected for four years.

Education is free and compulsory for children between the ages of eight and sixteen, and the minimum school session is set by law at three months. The schools are administered by a state superintendent. The state maintains the University of Montana at Missoula, the Montana School of Mines at Butte, and colleges at Bozeman, Dillon, and Havre.

History. Montana was first explored by the French in 1742. That part of the state east of the Continental Divide was a part of the Louisiana Purchase of 1803. Lewis and Clark explored the region in 1805 and 1806, and they were followed by miners and trappers. The first settlement was a Catholic mission established in 1841. The first important settlements were made by the gold seekers. Gold was first located in 1852, but important discoveries were not made until 1861. These discoveries stimulated the growth of towns and the development of the state. They brought railroads and prosperity.

Although Montana had been created a separate territory in 1864, it was not admitted to the Union as a state until 1889. Helena is the state capital. Progress in the state has been greatly stimulated by the development of the national parks and forests, which attract many visitors. Montana is noted for its progressive policies, and it was the first state to elect a woman to the United States Congress. See HELENA.

MONT BLANC, *mauN blahN*. Towering high above the surrounding Alps, snow-capped Mont Blanc is the most famous mountain in Europe. The mountain is located in France, although part of it spreads across the borders of Italy and Switzerland. It is a gigantic mass about thirty miles long and ten miles wide, dotted with a number of sharp peaks, the highest of which attains an altitude of 15,-

781 feet. From its icy cap tremendous glaciers are constantly crawling downward in all directions; the most famous of these is the Mer de Glace.

The summit of the mountain was first conquered by a French guide, Jacques Balmat, in 1786. One of the peaks of Mont Blanc has been renamed Wilson Peak by the French to honor Woodrow Wilson, twenty-eighth President of the United States. See MER DE GLACE.

MONTCALM DE SAINT-VERAN, *mohN kalm' de saN va rahN',* LOUIS JOSEPH, Marquis de (1712-1759). Canada is British today, but it still honors the name of Montcalm, the French commander who fought a brave but losing battle against the English in the French and Indian War. Becoming leader of the French forces in Canada in 1756, Montcalm distinguished himself by capturing Fort Ontario, Fort William Henry, on Lake George, and Ticonderoga.

Upon his withdrawal to Quebec, the English under Wolfe followed him. In July, 1759, the all-important Battle of Quebec took place. Montcalm shifted his men to the Heights of Abraham, where they were defeated by the English under General Wolfe. Mortally wounded, Montcalm died with these words on his lips: "Thank God, I shall not live to see the surrender of Quebec." See CANADA, DOMINION OF; FRENCH AND INDIAN WARS; WOLFE, JAMES.

MONTE CARLO, *mon'ta kahr'lo.* See MONACO.

MON'TE CRIS'TO. Romance adorns the little Italian island of Monte Cristo, in the Mediterranean, twenty-five miles south of Elba, for it is the scene of Dumas' famed novel *The Count of Monte Cristo.* A penal colony is located on the island.

MONTENEGRO, *mon ta na'gro.* See YUGOSLAVIA.

MONTESQUIEU, *mon tes ku',* CHARLES DE SECONDAT, Baron de la Brède et de (1689-1755). A distinguished French philosopher and historian, Charles Montesquieu profoundly influenced the political doctrines of the framers of the American Constitution through his book entitled *The Spirit of the Laws,* published in 1748. His division of the government into the executive, legislative, and judicial branches was incorporated into the American form of government. Montesquieu was educated as a lawyer but soon turned to writing. His first important work was *Persian Letters* (1721), a collection of imaginary correspondence in which he expressed his opinions on French politics, literature, religion, and social conditions. The author was made a member of the French Academy in 1728.

MONTESSORI, *mon te sahr'i,* MARIA (1870-1952). With the possible exception of the great German educator, Froebel, no person has had a greater influence on the teaching of very young children than Maria Montessori, originator of the Montessori Method. Originally she studied for the medical profession at the University of Rome, receiving her degree in 1894. She was the first Italian woman ever to be so honored. Following her graduation, she became associated with a clinic as assistant doctor, her specialty being the treatment of feeble-minded children.

In 1898 she became the director of a "mind-strengthening" school for the training of the feeble-minded; and so successful were her methods that they began to be used in training normal children. Madame Montessori, after establishing the school, returned to the University of Rome for special work in experimental psychology. She was soon placed in charge of the infant schools (corresponding to kindergartens) located in the slums of Rome.

The Montessori Method. Training under the Montessori Method begins at the age of three, when the child is given a block of wood filled with holes, into which plugs of corresponding sizes are to be fitted. If the child places a wrong plug in a hole, he will soon discover that the remainder of the plugs will not fit. This activity, like most of Montessori's training, is based on the senses, particularly the sense of touch. The child next learns to lace, button, and hook cloth together, these fabrics being mounted on wooden frames. The children are not taught to write, but learn the sounds of letters and syllables, and are soon able to piece together words, often at the age of four and one-half years.

They learn numbers by counting sticks. As time goes on, the children learn to identify colors, wash and dress themselves, brush their teeth, clean their nails, and brush their hair. The advanced stage of the method includes drawing, coloring, and the writing and reading of simple words and phrases. Although the Montessori Method is often used for children up to ten years of age, it seems to work best in teaching children from three to five years old

MONTEZU'MA (1466-1520). Disappointed in himself and despised by his people, Montezuma, emperor of the Aztecs, met an unhappy death. And with his passing disappeared the civilization of the Aztecs, for the Mexican Indians could not hold out against the Spaniards. When Cortez led the Spaniards into Mexico, Montezuma at first believed that they were gods. But he soon learned otherwise and attempted to destroy them. The Spaniards captured him; and, when he attempted to quell a rebellion by the Aztecs, his people stoned him. He died a few days later. See AZTEC; CORTEZ, HERNANDO.

MONT'FORT, SIMON DE, Earl of Leicester (about 1208-1265). A famous champion of the constitutional rights and liberties of Englishmen was Simon de Montfort. Although born in France, he joined the cause of the English nobles in the movement against the tyranny of Henry III, who was forced to acknowledge the Provisions of Oxford, upholding the rights of the people (1258). Henry appealed to the Pope, who released him from the obligation; but Montfort objected, and Louis IX of France was appointed arbiter. Henry won his case, but in the ensuing struggle with the nobles, Henry was defeated at Lewes, and was forced to sign another agreement. Montfort, who held more power than the king, summoned a Parliament in 1265 which permitted representatives of the towns to hold seats. He thus helped to preserve the popular branch of Parliament.

MONTGOMERY, ALA. Situated on high red bluffs that overlook a sharp bend in the Alabama River, Montgomery, the capital of the state, lies in the center of a rich farming region known as the Black Belt, for which it is the chief market and distribution point. It is a modern city with many outstanding structures, the largest of which is the beautiful capitol, which stands at the head of the main street. It was built in 1851, and there, ten years later, Alabama voted to secede from the Union.

The products of the surrounding region are brought to Montgomery for shipment; for, in addition to excellent railroad facilities, it is a hub of highway transportation and has good airline service. The city is a commercial center for such products as cotton, lumber, and beef cattle. Included in the wide variety of manufactures are railroad equipment, furniture, glass, food products, lumber, and cotton goods. There are also brick, tile, and marble works, and factories and mills turning out fertilizer, syrup, and cottonseed oil.

De Soto visited the site of Montgomery in 1540, but the first settlement was not established until 1817. The first was called New Philadelphia, and a year later East Alabama was founded. The two united in 1819 and adopted the present name in honor of General Richard Montgomery. The place became the state capital in 1847. At the beginning of the Civil War it was the capital of the Confederate government. Montgomery has a commission form of government. The population is approximately 135,000.

MONTH. In Anglo-Saxon the word for *moon* was *mona,* and that for *month* was *monath.* The connection between the two is apparent, and there is a similar connection in most of the languages of Europe. For the month was originally the period in

C.P.R. Photo

THE HEART OF A GREAT METROPOLIS

In the center of Montreal the giant Sun Life Building is neighbor to St. Jacques Basilica.

which, it seemed to our ancestors, the moon grew to fullness and waned again. Modern astronomers have found that the exact time required for a complete revolution of the moon is twenty-nine days, twelve hours, forty-four minutes, and three seconds. This period is called a *lunar* month.

The ancients could not measure it so exactly, but they did discover that the twelve cycles of the moon almost coincided with the passage of a year. At first they tried to make the coincidence exact by *intercalating,* or inserting extra days into the calendar, but afterward they simply divided the year into twelve periods which only roughly corresponded with the lunar months. These twelve periods are *calendar* months.

It is interesting to note that the names of our months come to us from the Latin, and the names of the days of the week from the Anglo-Saxon. The reason may be that in the days when few people could read and write, the common people were able to reckon what day of the week it was, but not the day of the month. Thus the days kept their common language names, while the months came to be called by the Latin names by which the monks and other educated people knew them.

In these volumes there is an article on each of the months.

MONTPELIER, *mont peel' yur,* Vt. Lying in the heart of a region of lakes and mountains and situated on the Winooski River in the north-central part of the state, Montpelier, the capital of Vermont, is noted for the beauty of its natural setting. Though small, it is a modern city which serves as the center of the political activities of the state and which supports several thriving industries. Industrial products include machinery, woolen goods, leather, and hardware. The home offices of a number of large insurance companies are located there.

Among the important buildings in Montpelier, which was the birthplace of Admiral Dewey, are the state capitol, the Montpelier Seminary, the state arsenal, Heaton Hospital, Kellogg-Hubbard Library, and the National Life Building. Settled in 1787, Montpelier became the capital in 1805. It is governed by a mayor and council and has a population of about 8,500.

MONTREAL, *mon tree awl',* Que. One of the oldest and most important commercial cities of North America is Montreal, long the largest city in Canada. It is a picturesque city, built on an island where the Ottawa River joins the Saint Lawrence. In its center rises rugged Mount Royal, from which the city takes its name. Montreal is one of the most interesting cities in Canada, for it combines in its old and new sections the spirit of modern development and the influence of the original French settlers.

A Picture of Montreal. Lining the river front are the grain elevators, wharves and docks, railroad tracks, and warehouses which make this section the commercial center of the city. Back of this district is the wholesale district, which merges with the main financial and business sections. The residential areas of Montreal are unusually beautiful, particularly those on the slopes of Mount Royal.

An interesting fact about Montreal is that its eastern section was long almost entirely inhabited by French Canadians and its western section by those of English birth or descent. Even now, the two groups are so large that many residents find it necessary to be able to speak both French and English.

Outstanding architectural achievements are the many churches, notable among them being Christ Church Cathedral (Anglican) and the Presbyterian Church of Saint Andrew and Saint Paul. Catholic edifices include Notre Dame Cathedral, Saint James Cathedral, and Notre Dame de Bon Secours.

In the center of the city is a square called the Place d'Armes, surrounded by imposing buildings. Here stand the Bank of Montreal, Notre Dame Cathedral, the Royal Trust Building, and the post office. Around the Jacques Cartier Square are the Chateau de Ramezay, an historical museum, the city hall, and the court house. Scattered through the city are small squares in which are statues and monuments. On one of the numerous islands in the river is Saint Helen's Park. The most beautiful park, however, is the one on top of Mount Royal, overlooking the city.

Education. The province of Quebec provides separate schools for Catholics and Protestants, the language of the Catholic schools being French. Among institutions of higher learning are McGill University (Protestant) and the University of Montreal (Catholic).

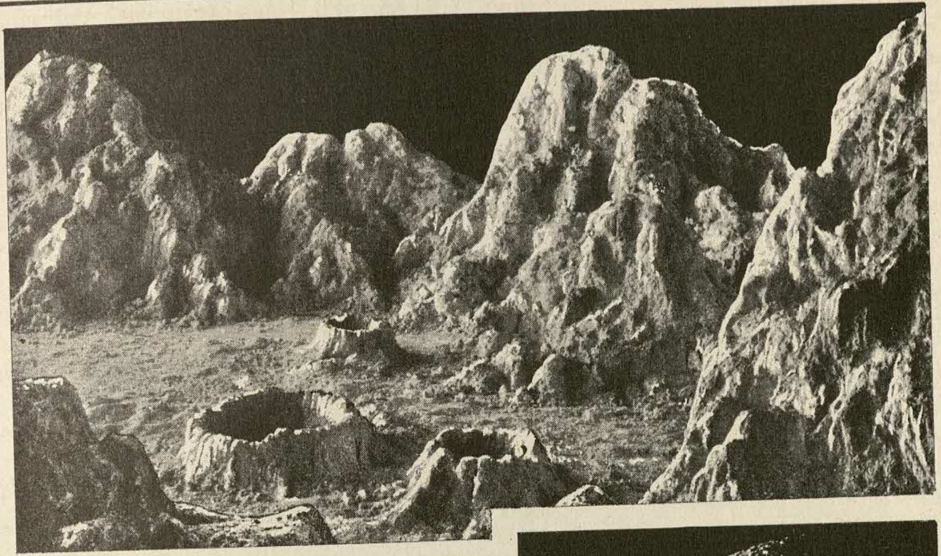
Trade and Manufacturing. Although Montreal is over 900 miles from the Atlantic Ocean, it is one of the greatest ports on the continent. By way of the Saint Lawrence, the largest ocean vessels can reach its wide harbor. It not only handles a major part of Canada's transatlantic freight and passenger traffic, but also much of its Great Lakes shipping.

The city is the commercial, financial, and manufacturing center of Canada. Articles of export include grain, lumber, flour, and manufactured goods; imports include textiles, iron, tea, and sugar. Most important of the many manufactures are boots and shoes, locomotives and railroad cars, cement, flour, machinery, lumber products, leather goods, tobacco, and paper.

History. Montreal was originally the site of an Indian village. This place was visited by Cartier in 1535 (see CARTIER, JACQUES). In 1642 a group of French colonists established a settlement which they called Ville Marie de Montreal. For the next century the French controlled the settlement and surrounding territory, but in 1760 Montreal was captured by the English. From 1844 to 1849 it was the capital of the Canadian government. With the development of the railroads, Montreal became the chief railroad terminus, and this fact greatly aided its growth and development. Later it became a busy airlines center. Its population is well over a million, not counting its many suburbs.

MOON. Of all the heavenly bodies, the earth's satellite is the most easily studied by the casual observer, since it is the only one whose main features are visible without the use of a telescope. Its average distance from the earth is some 239,000 miles. The Soviet rocket Lunik II hit the moon in September, 1959. In October, 1959, Lunik III circled the moon, sending back photographs of the other side, then going into an earth-moon orbit.

The dark and light patches on the moon which, in arrangement, crudely resemble a man's face, are really large physical features. The telescope shows the dark areas



RUGGED MOUNTAINS OF THE MOON

Dead and fearful to earthly eyes, our lunar satellite apparently has no air nor water, supports no animal nor vegetable life.

to be vast plains; the light sections, great mountain chains. Precipitous bluffs, deep, canyonlike openings, and enormous craterlike depressions mark the surface. Many mountain ranges as well as many of these craters have been mapped. Some of the latter are over sixty miles in diameter and exceed four miles in depth. Aconcagua, the highest mountain in the Western Hemisphere, if placed on the bottom of one of the largest of the craters, would still have its peak over 1,000 feet below the level of the rim. The mountains, on the other hand, reach enormous heights; some of them rise 20,000 feet, a very great altitude, considering the size of the moon.

Because the moon is only about one eighty-second as heavy as the earth, the pull of gravity on its surface is much less than that on the earth's—only one sixth of it, in fact. A person weighing 120 pounds on earth would, if transferred to the moon, weigh only twenty pounds. One of the most important consequences of this small attraction is the moon's failure to hold to itself an atmosphere, if indeed it ever had one. Since lack of atmosphere implies absence of water, very cold nights, and excessively hot days, life as we know it may be impossible on the moon.

The moon revolves around the earth in about twenty-seven and one-third days, called the *sidereal month*. A *lunar month,* the average time between one new moon and another, is slightly more than twenty-nine and one-half days long. Owing to the rotation of the earth, the moon appears to rise in the east and set in the west, as do the other members of the solar system. However, since the moon has moved forward in its own orbit, while the earth has been rotating, the latter must turn farther than a complete rotation before "catching up" with the moon. Thus, more than twenty-four hours elapse between successive moon risings. During its revolution about the earth, the moon also completes a rotation upon its axis, thereby keeping the same side constantly turned toward the earth. The period of the moon's revolution is used as the approximate basis for our calendar month (see MONTH).

Since the moon shines by reflected light, only one half of its surface is ever illuminated. The proportion of the lighted half which we can see depends upon its position. This gives rise to the *phases* of the moon—new moon, first quarter, full moon, or second quarter, and third quarter. It should be noted here that the *same* half of the moon is always facing the earth. Sometimes the full moon gets into direct line with the earth and the sun, in which case it passes through the earth's shadow, producing an *eclipse* (see ECLIPSE).

Although moonlight is much appreciated on the earth, the actual amount of light and heat received, compared with that from the sun, is negligible. It has been estimated that the latter sends us as much in thirteen seconds as is received from the moon in a whole year.

The attraction of the moon is mainly responsible for the tidal movements and their important bearing upon ports and harbors (see TIDES).

MOON'STONE. A transparent or translucent variety of feldspar, the moonstone, used as a semi-precious gem, has a pearly luster and usually a bluish-gray or red tint. See FELDSPAR.

MOORE, THOMAS (1779-1852). Although Thomas Moore, one of Ireland's outstanding poets, wrote biographies and many fine poetical and prose works, he is world-renowned for his *Irish Melodies,* lyrical poems written to be sung to airs composed by Sir John Stevenson and others. They include such universal favorites as *Believe Me if All Those Endearing Young Charms, The Last Rose of Summer,* and *The Harp That Once Through Tara's Hall.*

Born in Dublin, Moore was educated at Trinity College. Later he went to London to study law. In 1803 he was appointed registrar of the admiralty court in Bermuda, but disliked the position and appointed a deputy in his place. He visited the United States and Canada, and returned to England. Sometime afterward, his *Odes* and *Epistles* appeared, and in 1817 Moore finished *Lalla Rookh,* an Eastern romance and his most ambitious poem. Within the next several years, he published biographies of Sheridan, Byron, and Fitzgerald.

MOORS. Spain was a great nation as long as the Moors lived there, but when they were finally driven out in the seventeenth century, the country declined rapidly. In the 900 years that they inhabited the peninsula, industry and agriculture flourished, learning was on a high plane, and architecture was a fine art.

The Moors received their name from the Mauretanians, who inhabited the southern coast of the Mediterranean. These people intermingled with the Arabian Mohammedans who swept over the region, and became known as Moors. Not content with their domination of Northern Africa, the Moors crossed the Strait of Gibraltar in 711 and defeated the Visigoths who held Spain. Then, in 732, they crossed the Pyrenees and swept all before them, until at Tours they were driven back by Charles Martel in one of the great battles of history.

For many years the Moors held sway in Spain, making it the most advanced of all European nations in the Middle Ages. But dissensions arose, and the Christian kingdoms of Castile and Aragon were formed. Before the end of the thirteenth century, the Moors held only Granada, and it fell to Ferdinand and Isabella in 1492. Many Moors left the country then,

Courtesy of the House of Seagram

GIANT OF THE DEER FAMILY

The giant bull moose may weigh as much as 1,500 pounds and carry antlers with a spread of more than six feet. In the fall mating season, bulls clash in savage battle. Their roars can be heard for miles.

but there were also many who stayed and became leaders in trade and farming. But Philip II and Philip III did not understand their value to the country, and drove them out in the sixteenth and seventeenth centuries. The expulsion of the Moors was a major factor in the fall of Spain as a world power. Later, the Moors formed the Barbary States, known for piracy in the seventeenth, eighteenth, and nineteenth centuries. See BARBARY; SPAIN.

MOOSE. In huge size and strange stateliness of form and bearing, the moose surpasses all existing representatives of the deer family. The great head and the oddly formed nose and overhanging upper lip, surmounted in the male by the massive, flattened antlers, are unmistakable marks of the moose. The short neck, heavy humped shoulders, and excessively long legs of the moose tribe are equally characteristic.

Moose occur in the heavily forested country from Alaska and the Yukon southeastward to Saskatchewan, Montana, North Dakota, Wyoming, and Minnesota, but they are decreasing in their natural range. There are herds of moose in the game preserves of Yellowstone and Glacier parks, and in Alaska. In the East they are found in New Brunswick and Maine, and formerly extended some distance south in the Adirondack Mountains. They are especially fond of the dense thickets about marshes, shallow lakes, and streams.

Like other members of the deer family, the bulls lose their antlers during the winter and grow a new pair before the mating season the following fall. The young remain with the mother two or three years before starting out for themselves, and require several years to reach full size.

MORAINE, *mo rain'*. See GEOLOGY; GLACIERS; PHYSICAL GEOGRAPHY.

MORAL'ITY PLAYS. Following the mysteries and the miracle plays of the Middle Ages, the morality plays were the immediate predecessors of the modern drama. They received their name from the fact that they dealt with morals and conduct. They were less religious than those of medieval times. In these dramas the characters usually had names such as Poverty, Riches, Faith, Justice, Hope, and Greed; gradually, real-life characters began to be included. A typical morality play is *Everyman.* See MIRACLE PLAY.

MORAVIA. East of Bohemia, in northern Czechoslovakia, lies Moravia, until 1918 a crownland of Austria, but after that a part of the Czechoslovakian Republic. It was absorbed by Germany in 1939 and was part of the protectorate of Bohemia and Moravia until the liberation of Czechoslovakia in 1945. Covering over 8,600 square miles and largely a mountain-surrounded plateau, it is now part of the Czech province of Moravia and Silesia.

Moravia's products include grains, potatoes, flax, sugar beets, fruits, livestock, textiles, wool, steel, machinery, wines, glass, and leather goods. Its minerals, also important, include iron, coal, graphite, and slate. See CZECHOSLOVAKIA.

MORA'VIAN BRETHREN. Founded in Moravia and Bohemia among the followers of John Huss in the fifteenth century, the Moravian Brethren (or United Brethren) is a Protestant sect whose members strictly pattern their lives after the precepts and example of Christ and are very active in missionary work. The movement grew rapidly at first, but the sect was almost wiped out by wars and political difficulties in Europe. However, the organization was revived in the eighteenth century, when a band of Moravians fled to Saxony and built the town of Herrnhut, which later became the headquarters for the Church.

The first Moravians came to the United States in 1735, settling in Georgia, but later moving to Pennsylvania, where they established the permanent colonies of Bethlehem and Nazareth. Bethlehem and Winston-Salem, N. C., which they also founded, are the headquarters of the Church in the United States. Its chief colleges are here.

The Church is divided into four independent branches—the Continental and British in Europe, North American, and South American. However, a general synod with headquarters at Herrnhut, Germany, has authority over matters of doctrine and foreign missions. There are 50,000 members in the United States. See HUSS, JOHN.

MORE, THOMAS, Sir (1478-1535). Best remembered for his political romance, *Utopia,* the story of an ideal state on an imaginary island, Sir Thomas More was a famous English author, statesman, and religious figure. It is customary now to speak of any idealistic community as a "Utopia." The author of the story was born in London and, although intended for the priesthood, went into politics and entered Parliament in 1504. He won the dislike of Henry VII and left Parliament, but returned to court favor with the accession of Henry VIII, becoming a member of the king's council.

During the Reformation, More sided with Henry VIII in his defense of Catholicism and later succeeded to Wolsey's office of Lord Chancellor (1529). However, when Henry broke with the Catholic Church, More opposed him and resigned all his offices. In 1534 he was imprisoned, and in the following year was executed. Beatified by Pope Leo XIII in 1886, More was made a saint by Pope Pius XI in 1935.

MOR'GAN, DANIEL (1736-1802). A veteran of the French and Indian War, Daniel Morgan rendered valuable service to the American forces in the Revolutionary War. He was born in New Jersey and moved to Virginia in 1753. In 1755 he joined Braddock in the war with the French and won distinction on the frontier. When the war for independence broke out, he accompanied Benedict Arnold on the expedition to Canada, succeeding to command when Arnold was wounded and fighting until he was captured in the city of Quebec.

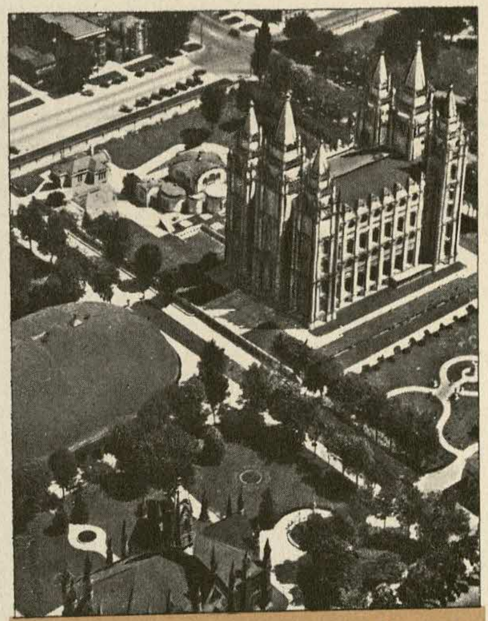
Taken prisoner, he was later exchanged and fought in the Saratoga campaign as colonel of a Virginia regiment. He was with Gates in the South, and later commanded the victorious American forces in the Battle of the Cowpens. During the Whisky Rebellion he was a major general, and in 1796 he was elected to represent Virginia in Congress.

MORGAN, Henry, Sir (about 1635-1688). Following in the footsteps of Drake, Hawkins, and other English seafarers, Sir Henry Morgan plagued the Spanish ships plying the routes between the West Indies, Central America, and Spain. Born in Wales, he was kidnaped when a child and made a slave in Barbados. Later he went to Jamaica, where he started his piratical career and became master of a ship. He is best known for the capture and pillage of Maracaibo in 1669, carried out in the bloodiest of pirate tradition.

MORGAN, John Pierpont (1837-1913). Probably the most noted banker and influential financier in American history, John Pierpont Morgan organized the United States Steel Corporation and until his death headed the international banking firm which bears his name.

Morgan was educated in Boston and at the University of Göttingen, Germany. He became American agent for the London bankers, George Peabody and Company, in 1860. The firm of Drexel, Morgan, and Company, later J. P. Morgan and Company, came into existence in 1871. At one time, Morgan held a controlling interest in 50,000 miles of railways, besides owning stock in numerous other corporations. He made very generous contributions to charity, art, and education.

John Pierpont Morgan, Jr. (1867-1943). The son of the elder Morgan headed the banking house founded by his father. He participated in the organizing of the International Marine Company, the purchasing of the Panama Canal rights from France, and the purchasing of supplies for the Allies during World War I. Under him, the House of Morgan prospered.

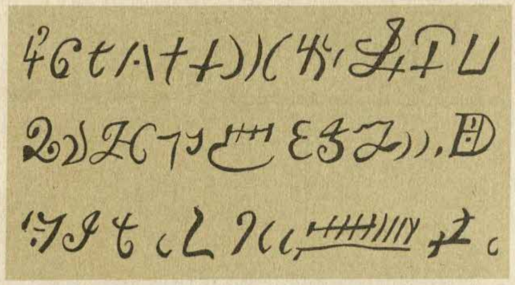


SHRINE OF LATTER-DAY SAINTS

Salt Lake City's historic square, which encloses the world-famous Mormon Temple, mammoth Tabernacle, and Assembly Hall.

MOR'MONS, or LATTER-DAY SAINTS. The Mormon movement had its beginning in 1830 when its founder, Joseph Smith, made known the revelation he claimed to have received from the Prophet Moroni. The Church founded by Smith is officially known as the Church of Jesus Christ of Latter-Day Saints.

Joseph Smith asserted that in 1820, when he was a boy of fourteen, he received his first revelation from God, the Father, and the Son; and that once each year, from 1823 to 1827, he had been visited by the ancient prophet Moroni who, on the last occasion, had delivered to him the golden plates of *The Book of Mormon* in which were engravings written in what Smith described as "Reformed Egyptian." Smith was able to translate the inscriptions, he said, with the aid of the key given in the Urim and Thummim of Scripture, which were also delivered to him. Smith dictated his translation to a friend, Oliver Cowdery, and issued the first edition of *The Book of Mormon* at Palmyra, N. Y., in 1830.



CALLED "REFORMED EGYPTIAN"
Strange script from the Mormon golden plates.

The first Mormon church was organized at Fayette, N. Y., on April 6, 1830. The members made a number of converts but encountered some persecution, too. Within a year, Smith and his followers said that a heavenly revelation had directed them to go to Kirtland, Ohio. They settled in Kirtland in 1831, and another group established a colony in Missouri at the same time. In 1835 the Mormons elected twelve apostles to preside over their Church, one of the twelve being Brigham Young, who was later to lead them to Utah; they also chose a council of seventy.

Trouble began for the Mormons in 1838, however. The Kirtland bank, of which Smith was president, failed. Smith and the Kirtland colonists fled to Missouri and joined the colony there. Before long the Mormons had become so powerful that they aroused opposition in Missouri and were told to leave. Smith, with 15,000 followers, therefore migrated to Illinois and founded the new city of Nauvoo.

After five years of prosperity, however, the Mormons were in trouble again. A Nauvoo newspaper, backed by certain dissatisfied members of the Church, accused Smith of immoral practices. The rest of the Mormons retaliated by destroying the printing plant. State militia were called out to quell the disturbance, and Joseph Smith and his brother Hyrum were taken to jail at Carthage, where a mob broke into the jail and shot them, June 27, 1844.

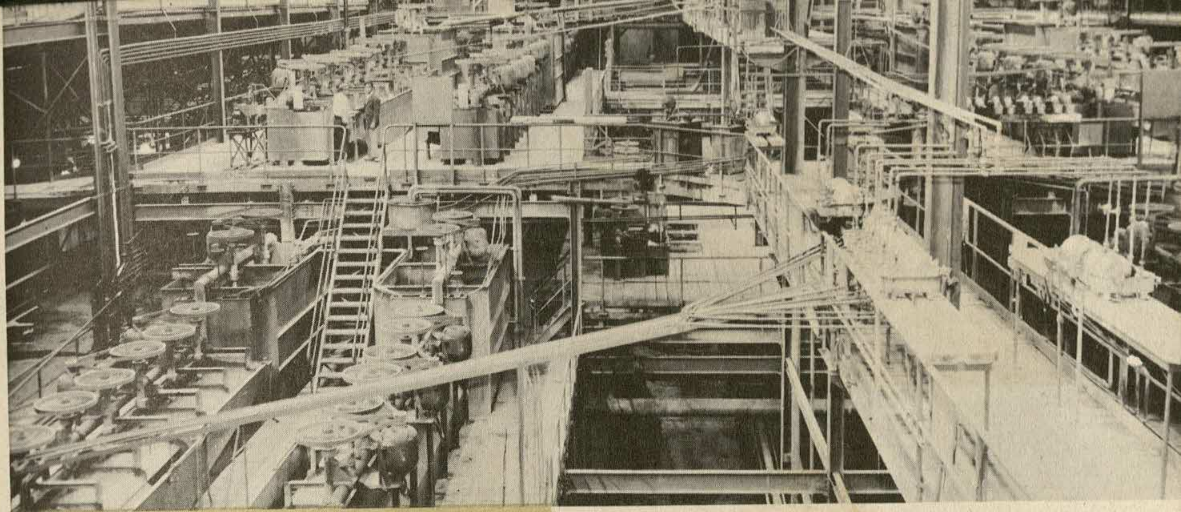
At the end of the Smith regime, Brigham Young became the leader. Like a modern Moses seeking the Promised Land, he led the Mormons on a long, hard journey to the present site of Salt Lake City, Utah. There followed years of drought and a struggle to wrest a living from the arid soil; but the determined band of pioneers persisted, irrigated the land, and prospered.

For years the practice of polygamy by some of the Mormons brought persecution and bitter opposition from non-Mormons. The early Church members said that polygamy had been decreed by Joseph Smith; members of the present Reorganized Church say that it was instituted by Brigham Young in Utah. However, the Lamoni edition of *The Book of Mormon* denounces the practice, the United States Congress ordered polygamy abolished in 1882, and in 1890 the president of the Church forbade it.

Salt Lake City, the center of Mormonism, has developed into a beautiful city with a great temple, tabernacle, and other church structures. Thrift and industry are characteristic of the Mormons, with the result that economic conditions among them remain fairly stable. The Church is maintained by the payment of tithes, ten per cent of the income of each member. Mormons have worked out their own system of relief, whereby the poor and unfortunate among them are provided for within their own membership.

The Church has grown until today it has a membership of well over a million in the United States alone, and in addition has missionaries and members throughout the world. The Reorganized Church is an independent organization. See LATTER-DAY SAINTS, REORGANIZED CHURCH OF JESUS CHRIST OF.

MORNING-GLORY. Many popular garden plants belong to this family of twining herbs or shrubs. The graceful, delicately tinted funnels of the common morning-glory, which open in the early morning and close in the strong sunlight, are known to all. Among the many varieties, purple, pink, blue, and white are the common colors. The Japanese grow morning-glory flowers as large as seven inches across.

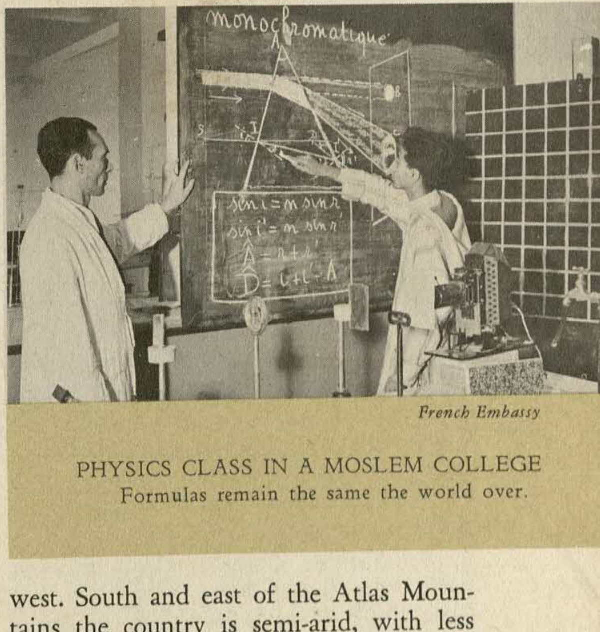


Wide World

LEAD PROCESSING PLANT
Modern methods show profits for a Moroccan lead mine that dates back to ancient times.

MOROCCO, *mo rok' o.* The ancient kingdom of Morocco lies between the Mediterranean Sea and the Sahara Desert in the northwestern corner of Africa. The Strait of Gibraltar is at its northern tip. Morocco is bounded by the Atlantic Ocean, the Mediterranean Sea, Algeria, and Rio de Oro. It has 172,104 square miles, and a population of about 10,225,000. From Morocco, the Moors crossed into Spain to found their brilliant civilization. From the time of the Vandals to the early nineteenth century, pirates have found the Strait of Gibraltar a tempting spot to ply their trade. This strategic area aroused interest in the great powers of Europe in the last century, and Morocco fell under French and Spanish protection which ended in 1956.

The Land and Its Products. In general, Morocco is a mountainous country, being crossed from southeast to northwest by the Atlas Mountains, while smaller and less important ranges are found near the coast and in other parts of the mainland. The smooth coast line does not provide many good harbors. The climate ranges from tropical to subtropical. Rainfall is abundant along the Mediterranean seacoast, but decreases in amount toward the south and west. South and east of the Atlas Mountains the country is semi-arid, with less than ten inches of rain a year.



French Embassy

PHYSICS CLASS IN A MOSLEM COLLEGE
Formulas remain the same the world over.

Resources and Industry. Crop raising and livestock production are the most important sources of income for the people of Morocco. The forests have not been seriously exploited, although they contain valuable timber. The mining of phosphates is important, and there are deposits of coal, lead, iron, manganese, tin, copper, and petroleum. During the French protectorate, improved methods of farming and mining were introduced, and the manufacture of chemicals, textiles, and other products was encouraged.

Wide World

MOROCCANS RETAIN TRADITIONAL HEADGEAR

The metal worker, above left, wears a traditional fez while he creates intricate designs on a tray. Skill and patience are necessary for this age-old art. A government official, above right, chooses a hooded cloak as protection against the desert, but wears a western shirt and tie.

Morocco's coastal waters yield fish, sponges, and coral. Grains are the major crop, but a variety of fruits and vegetables are also raised. Livestock provides the animal products from which Morocco's handsome woven carpets and fine leather goods are made, and the country also produces some chemicals, flour, olive oil, wines, and textiles.

The People. Moroccans are of both Berber and Arab descent. Their ancestors were called Moors in the old times. Moroccans speak Arabic and Berber languages. The official language is Arabic. Islam is the religion of the Moroccans. Europeans and a Jewish population live in the larger cities. Morocco has four capitals, Rabat, Fez, Marrakesh, and Meknes, but most of the government offices are in Rabat. Tangier, located at the Strait of Gibraltar, and Casablanca on the west coast are other Moroccan cities. Casablanca, the largest city, has a population of about 700,000.

Government. The king is the ruler of Morocco and is succeeded by his male heir. The king chooses an assembly of seventy-six members to make the laws. The king also chooses a council, with a prime minister as the head, to carry out the laws. The courts administer Moslem and French law.

History. Once part of the Roman province of Mauretania, Morocco had come under Arab control by the end of the 600's. Many of the Moorish invaders of Spain came from Morocco and returned there after the Christian victory over the Moslems in 1492. As one of the Barbary States, Morocco came into conflict with the United States and the European powers in the early 1800's, and after its piracy had been suppressed, its strategic location and resources continued to attract European interest. In 1912 the powers agreed that France should assume a protectorate over most of Morocco, with Spain controlling a narrow coastal strip. The revolt of the Riffs shook the Spanish Zone between 1921 and 1926. Tangier was internationalized in 1923.

In 1942, Allied troops landed on Morocco's Atlantic coast and made Morocco an Allied base of World War II. The Allied heads of state met at Casablanca in 1943. In 1956, France ended its protectorate over French Morocco, and the international zone of Tangier was restored to Morocco by the great powers. Spain ceded Spanish Morocco to the Moroccan government in 1958. France and the United States gave up their air bases in Morocco in 1960. See ARABS; BARBARY; BERBER; MOORS.

MOROCCO is a soft grained leather made from goat skins. It was probably developed by the Moors. It is used for book bindings, upholstery, fine shoes, and many small articles. Imitation morocco is made from calf and sheep skins.

MORPHINE, *mor′ feen.* The most important alkaloid of opium, morphine is a soothing drug, extensively used to kill pain and to stop coughing and other physical disturbances. Usually it induces sleep and is given by hypodermic injection. Taken in large doses, it may cause instant death; used over a long period, it may result in the taker's becoming a "dope" addict—a physical, mental, and moral wreck. As a result, many governments carefully control its sale. See OPIUM.

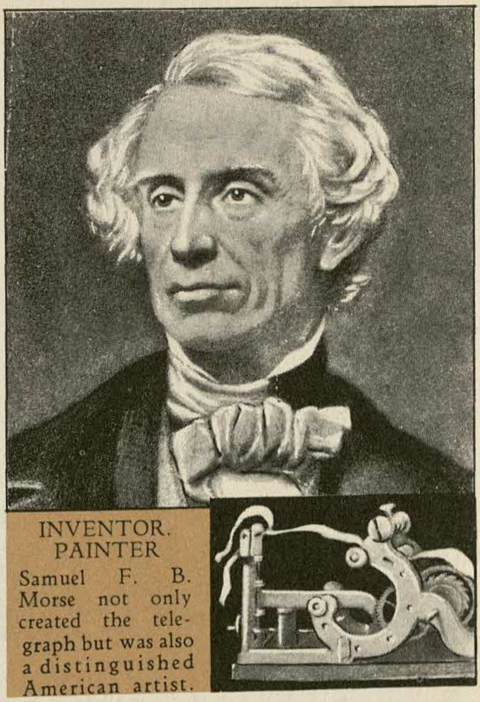
MORPHOLOGY, *mor fol′o gi.* See BOTANY.

MORRIS, GOUVERNEUR (1752-1816). During the struggle of the thirteen colonies for freedom, Gouverneur Morris was an influential figure. He was a member of both the Continental Congress and the Constitutional Convention.

Morris was born at Morrisania; N. Y., received his education at King's College (now Columbia), and was admitted to the bar in 1771. Following his term in the Continental Congress, he was appointed assistant superintendent of finance under Robert Morris. During the drafting of the Constitution, he favored a strong central government and supported Washington. He was later sent as minister to France (1792-94), and from 1801 to 1803 served in the United States Senate.

MORRIS, ROBERT (1734-1806). Among the signers of the Declaration of Independence was Robert Morris, who helped the colonies win their freedom through his expert management of their finances during the critical years of the Revolution. Born in Liverpool, England, Morris emigrated to America at the age of fourteen, and eventually became a partner in a successful mercantile business in Philadelphia.

He served several terms in the Pennsylvania legislature, and from 1775 to 1778 was a delegate to the Continental Congress. Morris was chosen Superintendent of Finance in 1781, under the Articles of Confederation, and rendered valuable aid to the American cause when his financial ability was most needed. In 1787 he was a member of the Constitutional Convention, and he held a seat in the United States Senate until 1795.



INVENTOR. PAINTER
Samuel F. B. Morse not only created the telegraph but was also a distinguished American artist.

MORSE, SAMUEL FINLEY BREESE (1791-1872). Telegraph keys clicking out millions of words daily throughout the world pay homage to Samuel F. B. Morse, inventor of the instrument that has made communication a matter of seconds instead of hours and days.

A native of Charlestown, Mass., Morse attended Yale College, and after his graduation studied painting. Experimenting with electromagnetism, Morse finally evolved the telegraph, and proved its success in 1835 in his room. However, he found it difficult to secure money to develop the invention, and it was not until 1844 that an experimental line from Washington to Baltimore was successfully completed. On May 24 this line carried the first telegraph message sent in America—"What hath God wrought?"

Morse was more than just the inventor of the telegraph, although that alone would have been sufficient to perpetuate his name. He was the first president of the National Academy of Design, which he founded; he laid the first submarine cable across New York Bay; he took the first daguerreotypes made in America; and he was elected to many scientific and scholarly societies both in America and abroad. See TELEGRAPH.

MORTAL'ITY, LAW OF. Out of a given number of people who enter an age group, a certain percentage are likely to die. This is the law of mortality, which is computed by means of tables and statistics. The percentage of deaths within a certain age group does not remain constant from year to year. The average length of life of white males in the United States has increased as follows: 1901, 48.2; 1910, 50.2; 1920, 54.1; 1930, 59.1; 1940, 62.8; 1950, 65.9. Better living standards and the advancement of medical science have helped to bring similar increases in the average length of life in other groups.

MORTAR, *mor'tur.* Once important as heavy artillery, the mortar has become a major weapon of the infantry. In its modern form it consists of an unrifled barrel a few feet long, into which a bomb-like, finned shell is dropped. The projectile shoots out at a steep angle and has a range up to about 3,000 yards. Some mortars weigh less than forty pounds.

The most powerful and deadly mortars in World War I were those of the Germans. They were capable of firing a distance of over eight miles, and they shot a projectile sixteen and one-half inches in diameter. Combined with the howitzers, the mortars easily destroyed the strong fortifications at Liege. The mortar was further perfected for use in World War II. See ARTILLERY; CANNON; HOWITZER.

MORTE D'ARTHUR, *mort dahr tur'.* Tales of King Arthur and his Round Table have come down to us from *Morte d'Arthur,* compiled by Sir Thomas Malory and published in 1485. This version of the legend is the basis of Tennyson's *Idylls of the King.*

MORTGAGE, *mor' gaje.* When real property is pledged for the payment of a debt, the written instrument which governs the transaction is a mortgage. Land and buildings thereon, growing crops, personal property of recognized value, and the like are recognized as proper pledges on which to borrow money. A mortgage is virtually a transfer of ownership of the thing pledged; it may be so in reality in case of personal property subject to redemption by the debtor and return to him.

When real property is pledged, its possession remains in the hands of the borrower, called the *mortgagor,* but the lender, called the *mortgagee,* has certain rights in law which the mortgagor is bound to respect. It is the latter's duty to conserve the property pledged, so that, while his obligation runs, the value of the pledge shall not decrease, except through ordinary deterioration.

A mortgage must specifically describe the thing pledged, and there must be clear statements made as to the time and manner of making payment. The mortgage with its several provisions is recorded on the records of the county in which the property is situated, as a matter of protection to the parties concerned, and as notice to third parties who may wish to buy the property that an encumbrance exists.

At the expiration of a period specified

by statute, after the mortgage becomes due and any part of it remains unpaid, the mortgagor may institute a foreclosure suit, which seeks to have a court of competent jurisdiction debar the debtor from occupation and use of the premises, in order that the lender may have the return of his money. A notice of foreclosure is printed in a newspaper, or posted on the courthouse door or adjacent bulletin board, stating that, on a specified day, the property which is described will be publicly sold.

The sale is conducted by the sheriff's office; the property may be sold to the mortgagee for the sum of his claim, or to another for as great a sum, or more, preferably. Any proceeds from the sale in excess of the claim of the mortgagee and legal expenses, are given to the mortgagor.

Chattel Mortgage. A chattel is any item of movable property, such as an automobile, a wagon, livestock, jewelry, or the like, or immovable property, such as growing crops. A chattel mortgage is a legal document naming specified personal effects which are pledged as security for the payment of a debt.

Bonds as Mortgages. In a great building enterprise, $1,000,000 may be required for construction purposes. When no one person or bank will loan so great a sum, a mortgage for the amount may be split into many small parts, as $100, $500, and $1,000. Any purchaser of a bond of $100 is the owner of a small bit of a large mortgage, and he is protected by all the safeguards that were thrown around the entire loan (see BOND).

MOSAIC, *mo za' ik.* Decorative patterns made by piecing together, in cement, bits of colored stone, glass, marble, enamel, or similar materials to adorn surfaces, are called mosaics.

Beautiful mosaic is costly to produce but is an effective decorating scheme for the architect. The art is a very old one and goes back to ancient Egypt and Assyria. It was later practiced in Greece and Rome and was then widely used by the artists and builders of the Middle Ages. Excellent examples are found in Saint Mark's at Venice, in Saint Paul's at Rome, and in numerous medieval palaces and cathedrals throughout Europe.

The popularity of mosaic has been revived in recent years by new developments in the art of glassmaking. Notable examples of the mosaic art in America are in the Church of Saint John the Divine, New York City, and in Wade Memorial Chapel at Cleveland.

At first, mosaic was employed to adorn temples and public buildings with simple geometrical designs, usually in black and white stone. Intricate patterns and scenes in color were highly developed by the medieval artists, whose "paintings" in stone and glass depicted historical and religious scenes, portraits, and landscapes. The fragments of stone or glass are imbedded in a foundation of cement.

Courtesy Thos. Cook & Son

CHIEF CITY OF THE SOVIETS

The old Kremlin, Moscow's government citadel.

MOSCOW, *mos'ko,* RUSSIA. One of the most ancient cities in Europe, dating back to the twelfth century or earlier, is Moscow, the capital and most important city of the U. S. S. R. Lying some 400 miles southeast of Leningrad, it is the country's chief cultural center and the hub of its rail, air, and highway systems. The Moscow, or Moskva, River winds through the city and, with the Moscow-Volga Canal, gives it a navigable waterway. Although Moscow is the leading manufacturing center of the Moscow Industrial Region, it is even more important as a distributing point for the farms and industrial towns of that fertile, well-developed area.

Moscow contains many ancient buildings and monuments, as well as many modern ones erected since it became the Soviet capital in 1918. The huge, walled Kremlin, built as a fort and for centuries the home of Russia's rulers, was long the headquarters of the Soviet government. It later was made a historic showplace. To the west is the famous Red Square, where many mass demonstrations and parades are held. Here, too, is the mausoleum in which the permanently embalmed bodies of Lenin and Stalin lie in state in their glass-faced coffins. Also famous is old Saint Basil's Cathedral, with its many-colored Oriental cupolas and domes. Standing at the south end of the Red Square, it is now one of the city's many museums. The world-famous Moscow Art Theater, Opera House, Tretyakov Gallery, and Lenin State Library are among the city's treasures, as is the University of Moscow, which was founded in 1755. The city also has many large parks, churches, and former palaces, and one of the world's finest subways.

Called the "Holy Mother of the Russians," Moscow was the capital of the powerful feudal principality of Muscovy and, later, of the whole Russian Empire — from 1462 until Saint Petersburg (now Leningrad) was built in 1703. To drive out Napoleon, who occupied it in 1812, the Russians partly burned the city. Although the Germans besieged and nearly captured it in 1941, during World War II, Moscow held and was only slightly damaged by bombs. Despite its many parks and housing projects, the city remains badly overcrowded, and many of its people live shabbily. Having well over 5,000,000 inhabitants, Moscow is one of the world's largest cities. It ranks first on the continent of Europe. See LENINGRAD; UNION OF SOVIET SOCIALIST REPUBLICS.

MOSES, *mo'zes.* Leader of the Israelites in their flight from Egypt to the Promised Land was Moses. He was born in Egypt. See BIBLE STORIES.

MOSQUE, *mosk.* Nothing else so symbolizes the mystery and romance of the East as the mosque, the temple of worship for Mohammedans. Its slender, graceful minarets, from which five times a day the muezzin's call to prayer is heard; its square basilica surmounted by glittering domes; its arcade courtyard carved into pointed arches, all represent a people and a life very different from those of the Western World.

Inside there are no pews; only rugs on the floor placed there for prayer, and smoky lamps burning in the semi-darkness. Quotations in Arabic from the Koran adorn the walls, and splendid mosaics are usually found in exquisite profusion. In Constantinople (Istanbul), Saint Sophia, also known as the Mosque Mehmedie, contains all these features, and is the finest mosque in the world. Another grand mosque is the 1,200-year-old structure in Cordova, Spain, a reminder of the days when the Moors ruled Spain.

MOSQUITO, *mos ke'to.* Mosquitoes have long been known as annoying pests, but with the discovery that both malarial fever and yellow fever are disseminated only through the bite of the malarial- and yellow-fever mosquitoes, and that several species of mosquitoes are implicated in the transmission of certain tropical diseases, the mosquitoes as a class have now been placed among the worst of insect criminals.

There is probably not a country in the world that has not several species of mosquitoes. It is known that over 400 different kinds are found in North America, although only about six are common about houses. Of these, three are known to carry

A SINGING, STINGING PEST
This annoying insect, a carrier of disease, breeds in stagnant water. The female does the stinging with long, stiletto-like beak.

malaria and one is the disseminator of yellow fever.

The common house mosquito (*Culex*) occurs practically everywhere. The malarial-fever mosquito (*Anopheles*) is common over North America and the greater part of the rest of the world. The yellow-fever mosquito has been eradicated in the Southern states and in many tropical and subtropical countries.

Life History and Control. The larvae of all mosquitoes live in water, usually in stagnant ponds and pools. Open rain barrels, tin cans containing water, temporary pools, or mudholes provide suitable breeding places. The eggs may be laid singly, as are those of malarial-fever mosquitoes, or in small clusters called *rafts,* as are those of the house mosquitoes. Several hundred eggs are laid by one individual. The larvae are known as *wrigglers.* The larva has an air tube near the end of the body, and when air is needed, the larva floats to the surface and projects the air tube just above the water level.

The larval stage lasts from a few days to several weeks, depending on the species and the season. During the following pupa stage, the mosquito remains in the water, and within two to four days becomes an adult, ready to fly away. It is the adult female which bites, piercing the skin of her victim with her needle-pointed, filelike proboscis and sucking the victim's blood.

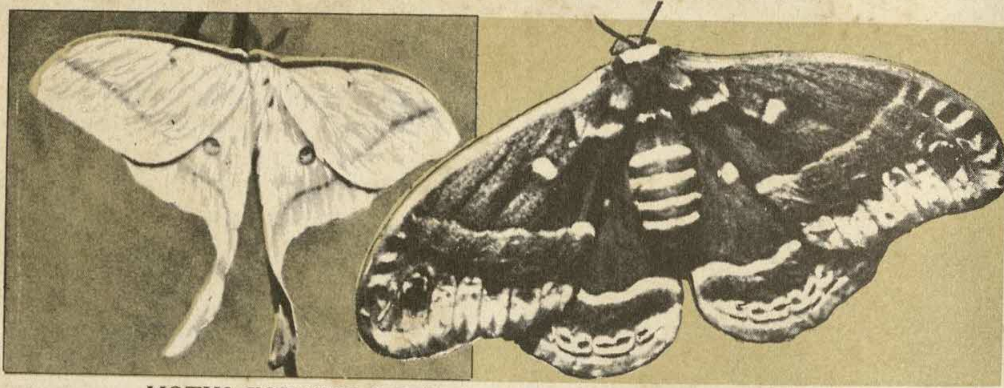
There are various systems of control. They include draining breeding places, covering stagnant water with a film of oil to keep the larvae from breathing, introducing larvae-eating minnows into infested pools, and spraying with an insecticide, such as an aerosol or DDT.

MOS'SES. Moss plants have two distinct forms. One form reproduces by sex cells, the other by spores (see SPORE). Almost all plants reproduce by one of these means. But, unlike most other plants, the sex-cell plant of the moss is the larger of the two forms. It is the plant we think of as a moss. It can reproduce only when wet. Its reproductive organs then open and the male cells swim over to the female cells and unite with them. From the fertilized female cell grows a tiny stalk with a little spore case at its tip. This is the spore-producing plant. When the spores are ripe, the case opens and the spores are carried away by the wind. If they land in a favorable spot, sex-cell plants grow from them.

Moss is among the oldest and hardiest of plants and has almost unlimited powers of multiplication. Many mosses grow in cold, rocky regions; and although they stop growing if dried out, they will immediately spring to life again if they receive moisture. By their rapid growth they furnish soil for other plants that could not otherwise gain a foothold. They also aid in protecting from cold the roots of more delicate plants. Some varieties of moss thrive best in swampy ground, and after several years may become many feet thick. The bottom levels then turn to peat and may be used as fuel.

In Arctic regions, mosses are the principal food of the reindeer. Mosses may also be used as bedding, as packing, and as a source of medicine. For such purposes the plant is gathered principally in the Orient.

Generally speaking, butterflies are harmless; many moths, on the other hand, are damaging to crops, particularly in the caterpillar stage. One species of moth is especially harmful to furs and woolen garments. Another is of great commercial use, for its caterpillar is the silkworm which spins the tiny threads that are manufactured into beautiful silk cloth.



MOTHS INCLUDE BOTH FRIENDS AND ENEMIES OF MAN

The silkworm moth may certainly be counted as a valuable ally, but there are many types of moth whose larvae are very destructive. Two of the giant silkworm moths are shown above. Left, the strikingly beautiful Luna. Right, a common variety, Cecropia.

MOTH. The gorgeously colored butterflies that flit about during the warm summer months are but a small section of the order of scaly-winged insects. The rest of the order consists of moths, which differ from butterflies in several respects. In the first place, the antennae, or feelers, of the moth are never enlarged at the tip, as are those of butterflies. The wings of moths are spread out and carried in a horizontal position when at rest, whereas those of the butterflies are vertical when at rest, with the underside of the wing exposed. Only a few kinds of moths fly in the daytime, but no butterflies are on the wing at night. Wing coloring and construction are decidedly different in the two kinds of insects.

Moth larvae, like those of butterflies, are caterpillars. Only experience enables one to distinguish between the two forms. Larvae of moths usually form cocoons; the caterpillar of the butterfly spends the pupal stage in a chrysalis.

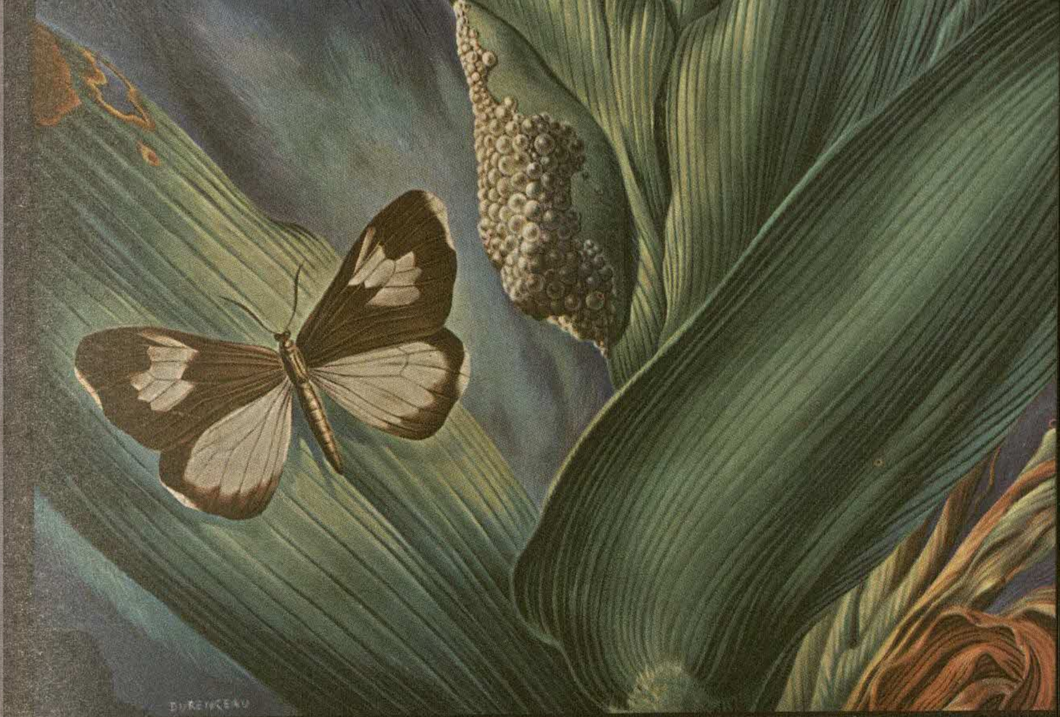
Consult the following titles for additional information:

Butterfly
Caterpillar
Death's-Head Moth
Gypsy Moth
Insects
Metamorphosis
Silk
Tussock Moth

MOTHER GOOSE. Humpty Dumpty and Little Boy Blue; the poor old woman who lived in a shoe; Little Miss Muffet and Little Bo-Peep; Jack and Jill and ponies and sheep; Simple Simon and lean Jack Sprat; Old King Cole who was merry and fat—they have lived for years in Mother Goose rhymes, from ancient days to modern times.

They are, by far, the most popular nursery jingles in the world, and the simplest literature for children. Yet they stimulate the imagination, and are a natural introduction to more advanced poetry and other juvenile verse.

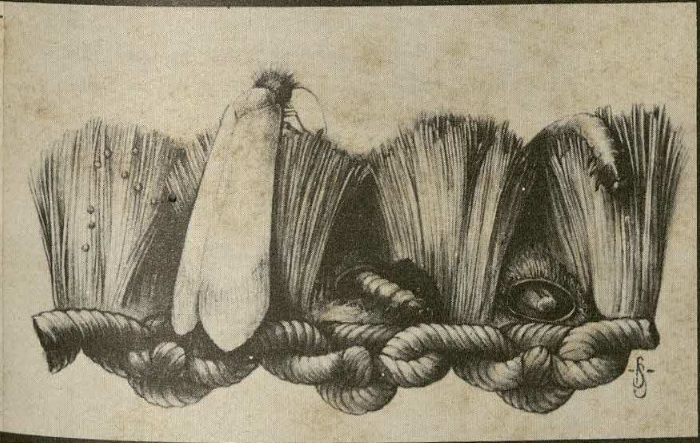
The name *Mother Goose* probably originated in the French legends concerning *Queen Goosefoot.* Charles Perrault, a French writer, assembled the rhymes in



Travelers Insurance Company

SOME MOTHS HAVE DANGEROUS ENEMIES

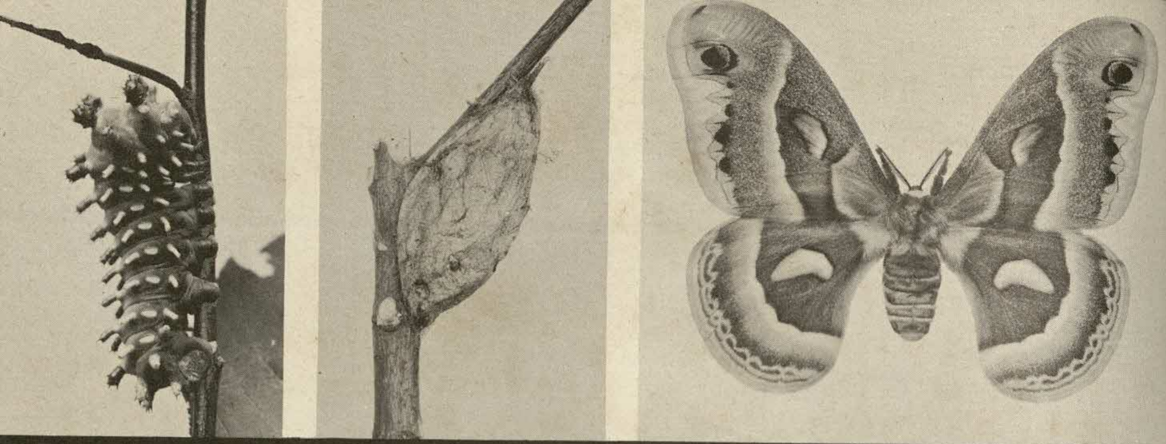
Parasites drill into the cocoon of this West African moth and lay their eggs on the body of the caterpillar. When the caterpillar is full-grown, the parasitic larvae eat it. To prevent this, the caterpillar produces tiny bubbles on its cocoon in an exact replica of those made by the parasites, and pretends to be dead.



U.S.D.A.

WOOL GATHERER

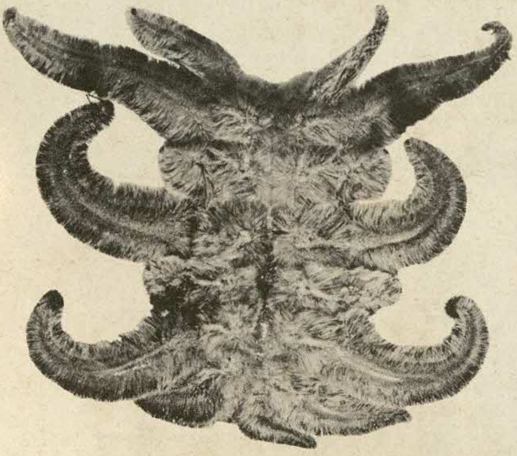
The common clothes moth is a household pest for woolen fabrics. In wool carpeting, the tiny straw-colored moth lays the eggs that hatch into the destructive larvae. The larvae eat at the base of the wool tufts and eventually cause a bare spot. In woolen clothing, they eat out tiny holes.



U.S.D.A.

SOME MOTH ENEMIES OF MAN

There are three distinct stages in the life cycle of a moth. First is the caterpillar, or larva; next, the cocoon, or pupa; and finally, the moth, or adult. The larva is usually the most harmful because of its voracious appetite. The *Cecropia* moth, largest of the silkworm moths, supplies silk from its cocoon, but the caterpillar is very destructive to fruit trees and to most of the common forest trees.

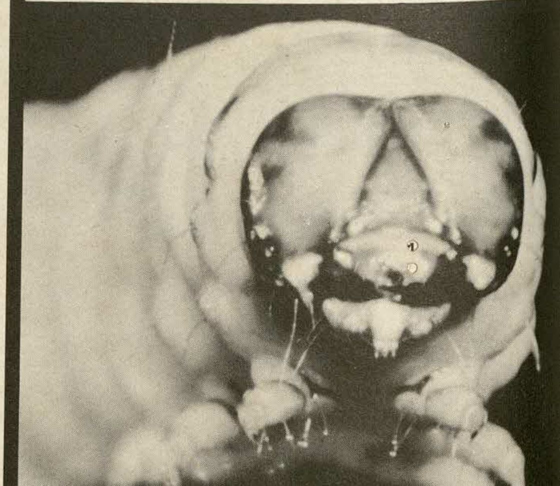


WHICH END IS UP?

The hag moth larva is named for its strange appearance. It feeds on various low shrubs and the lower branches of trees.

A PASSION FOR APPLES

The codling moth is the best known and probably the most important insect enemy of the apple. As soon as the larva hatches, it burrows to the core of an apple, usually causing the fruit to fall from the tree prematurely. This close-up shows the larva's face, magnified about thirty times.



book form in the seventeenth century, and the first English version appeared in 1760 in London under the title *Mother Goose Melodies*.

MOTHER-OF-PEARL, or NACRE. Mother-of-pearl is the hard, smooth, inner surface of several types of bivalve shells, chiefly those of the pearl oyster and fresh-water pearl mussel. Although it has no color of its own, this lining is made up of tiny overlapping layers which break up the light rays, thus producing many brilliant hues. The shells of several kinds of large tropical oysters have nacreous layers thick enough to make them commercially valuable. Mother-of-pearl is extensively used in inlay work and in the manufacture of knife handles, buttons, and other small objects.

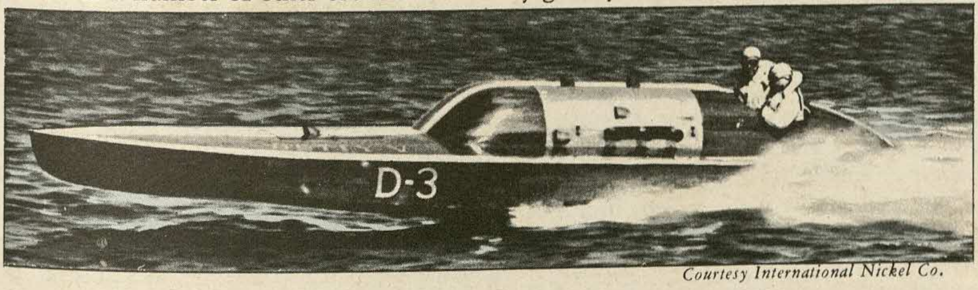
MOTHERS, National Congress of. See Congress of Mothers, National.

MOTHER'S DAY. Miss Anna Jarvis of Philadelphia is credited with proposing the recognition of the second Sunday in May as "a day dedicated to all mothers." She suggested the idea to influential men and organizations, with the result that Mother's Day was first observed in Philadelphia, May 10, 1908, and the second Sunday in May was declared a state holiday by Pennsylvania in 1913. The observation of this day was taken up by one state after another, and on May 8, 1914, an act of Congress authorized the President to proclaim the second Sunday in May Mother's Day, and to direct the flag to be displayed on public buildings. Mother's Day is celebrated in a number of other countries. Mother's Day, "in honor of the best mother who ever lived — the mother of your heart," is a day for boys and girls as well as for grown persons, wherever they may be, to turn their thoughts to mother. On this day flowers are sent to hospitals, almshouses, and orphanages, to cheer the sick and unfortunate. Carnations are commonly worn on Mother's Day. An official program for Sunday schools, churches, schools, and other organizations is issued annually by the Mother's Day International Association, the headquarters of which are located in Philadelphia.

MOTHERS' PENSIONS. Nearly every American state provides aid to dependent children in the form of monthly allowances to needy mothers. Many modern nations follow this practice. In some states the mother must be a widow; in others she may receive aid if her husband is in prison or is unable to work. Occasionally a state will grant a pension to any needy mother, and sometimes to any parent or guardian who is incapable of supporting a minor child. Usually the total sum paid varies according to the number of dependents, but there is a fixed maximum allowance.

MOTION, Laws of. See Dynamics.

MOTOR BOAT. Speed and sport on the water are furnished by the motor boat, a small vessel with a gasoline or Diesel engine which powers a screw propeller set in the stern. Since the engine is set either toward the stern or amidships, the gasoline or oil tank is placed in the bow, permitting the fuel to flow into the motor by gravity.



Courtesy International Nickel Co.

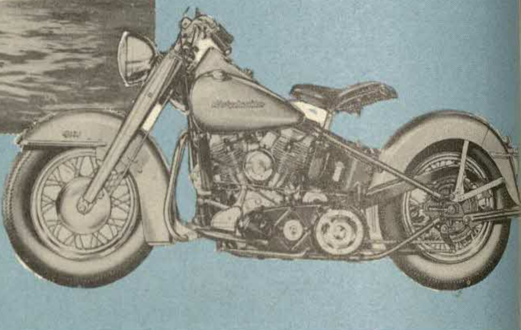
RIDING THE SPRAY — A SWEEPSTAKES WINNER

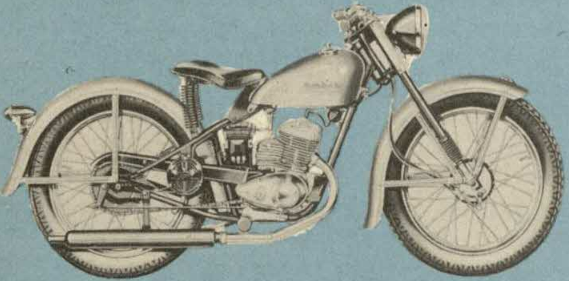
With sleek hull and supercharged motor, this hydroplane does eighty miles per hour.

Harley-Davidson Motor Co.; Chris-Cr

MOTOR BOAT DE LUXE

From the lightest "outboard" to th most luxurious yacht, the moto boat brings outdoor delight t thousands.





STEEDS OF THE HIGHWAY

For the thrills and pleasures of the open road, a variety of motorcycle models are available. The powerful machine above is much heavier than the light model at left.

Most motor boats are capable of a speed of ten to twenty miles an hour, although some pleasure craft can churn through the water at a rate of twenty-five to fifty-five miles an hour. High-powered racing boats, or speedboats, travel between forty-five and a hundred miles an hour, and some have gone even faster. The fast motor boats lift their bows entirely out of the water when under way. Any small boat may be made into a motorboat by means of a detachable outboard motor. But true outboard boats have hulls especially designed for motor operation. See Boat.

MOTORCYCLE. Combining the ease of operation of the bicycle with the speed and power of the gasoline motor, the motorcycle is a unique form of transportation which has been popular ever since the beginning of the twentieth century. The motor is small and compact, but capable of high speed. It is air-cooled, uses gasoline for fuel, and is operated by foot and hand levers.

Although true motorcycles have been known only since 1885, attempts were made to supply mechanical power to bicycles as long ago as 1868. Then a bicycle powered by steam was invented, and in the ensuing years frequent efforts were made to improve the machine.

Today, we find motorcycles used for a variety of purposes. Highway and traffic police use them to patrol the streets and highways; business establishments equip them with side cars for the delivery of goods, and private owners use them for sport. Motorcycles were used in both world wars, being employed by dispatch riders between headquarters and the front. They are an integral part of the motorized cavalry. See Bicycle; Carburetor; Gas Engine.

MOULDS. See Mold.

MOULTRIE, *mole' tri,* William (1731-1805). A valiant American soldier, William Moultrie ranks among the leading military figures of the Revolutionary War period. Born in South Carolina, Moultrie joined the patriot cause at the outbreak of the war, entered the provincial congress of South Carolina, and was made commander of a regiment of the state militia. For his defense of Charleston against the British sea forces in March, 1776, Moultrie was officially thanked by Congress, and the fort which he had built on Sullivan Island, Charleston, was named in his honor.

He also became a brigadier general and was given command of the Georgia and South Carolina armies. Captured in 1780, Moultrie was exchanged and elevated to the rank of major general. He served two terms as governor of South Carolina (1785 and 1794). In 1802 his book, *Memories of the Revolution,* appeared.

MOUND BIRD. From its peculiar moundlike nest this bird takes its name. A pile of grass, leaves, and other vegetable matter is collected, and the eggs are buried in this mass and are hatched by the heat of the decaying material. The young birds are strong enough to force their way out. The mound bird returns to the same nest year after year, and there is some indication that several birds may use the same mound. These birds are natives of Australia, although some species are known in New Guinea and other South Sea islands. The Australian brush turkey is the largest and best known of the group.

MOUND BUILDERS, a mysterious people who lived in the Mississippi Valley many years ago. All that is known about them is that they built earth and sand mounds and buried their dead in them, along with pottery, weapons, pipes, ornaments, and utensils. Some mounds are round, others are oval, triangular, or square. Some appear to have been used for defensive fortifications, others for ceremonial rites. Still others were built in the shape of serpents, men, birds, and animals.

The Cahokia Mounds are still in existence. They are set off in a state park in Illinois near East Saint Louis. One of the most unusual mounds is at Brush Creek, Adams County, Ohio. It is built in the shape of a serpent more than a thousand feet long, with an oval mound resembling an egg at the mouth.

The mound builders appear to have been considerably advanced in culture. Their pottery is of a very high type, and the ornaments, rings, and earrings of shell, pearl, and bones, show skillful workmanship.

MOUNTAIN, a mass of earth and rock rising from a valley, plain, or plateau. A mountain is different from a plateau in that its summit forms a peak, not a broad top.

Mountains always have been of great importance to man. They have controlled to a large extent the direction and limit of migrations and have affected transportation routes. Many essential minerals are found in the mountains, and the influence of mountains on climate affects the lives and habits of all who live near them. Mountains have protected people from invasion and war, making them independent of the rest of the world.

Mountains may be formed in several ways: by folding or faulting of the earth's crust, by the formation of volcanic cones or doming up of rock due to volcanic action below the surface, and by the erosion of elevated blocks of land. Some mountains have been formed by a combination of these processes. Most mountains are found in ranges, groups, or systems, although some single peaks occur near the borders of the continents.

The height of mountains may be measured by means of a barometer; a test of the boiling point of water, which varies with altitude; and by trigonometry, the most exact method. There is no exact way, however, of determining the difference between a hill and a mountain. Some authorities state that if an elevation of rock and earth rises more than 2,000 feet above sea level, it is a mountain.

Mount Everest in the Himalaya range, is the highest in the world, rising 29,028 feet above sea level. The highest peak in the United States is Mount McKinley in Alaska, 20,320 feet. The western face is a sheer drop of almost three miles. Aconcagua, 22,834 feet, is the highest peak in South America. The highest in Africa is Kilimanjaro, 19,340 feet. The lure of climbing these high mountains has led many

Sinclair Oil Corp.

MOUNTAIN GRANDEUR THRILLS VACATIONERS

Waterton Lakes National Park, north of Montana in Alberta, Canada, joins with Glacier National Park in the United States, to form the International Peace Park. This is a fitting name to commemorate more than 100 years of peaceful relations between the two countries. Vacationers from both countries enjoy the rugged beauty of these great parks.

men to their death, but the highest peaks have been scaled successfully.

For additional information, consult the following articles:

Adirondack Mountains
Alps
Andes
Appalachian Mountains
Cascade Range
Catskill Mountains
Caucasus
Coast Range
Cordillera
Everest, Mount
Geology
Green Mountains
Himalaya
Jungfrau
McKinley, Mount
Mont Blanc
Pyrenees
Rainier, Mount
Rocky Mountains
Shasta, Mount
Sierra Nevadas
Ural Mountains
White Mountains
Volcano

MOUNTAIN ASH, a tree belonging to the rose family, and closely related to the apple and the pear. It is called ash because its leaves resemble those of the true ash. Its most striking feature is its great clusters of orange-colored fruits, about one third of an inch thick.

MOUNT VERNON, the historic home of George Washington, on the right bank of the Potomac in Fairfax County, Va., and about fifteen miles south of Washington, D.C. It was erected in 1743 by Lawrence Washington and named after Admiral Vernon of the English navy. The tombs of

Weyerhaeuser Company

LOFTY SENTINEL FOR A TREE FARM

The snowy peak of Mount St. Helens rises 9,671 feet above tree-covered slopes in Washington. These stands of timber are grown and harvested as carefully as farm crops. The brownish places in the foreground are areas where trees have been cut. The standing trees supply seed for another crop from the harvested area, insuring a constant supply of lumber.

George and Martha Washington are a short distance from the house. The estate was purchased from Washington's heirs in 1860 by the Ladies' Mount Vernon Association, which restored the property.

MOURNING DOVE. See DOVE; PIGEON.

MOUSE. When people hear this word, they usually think of the common house mouse which has established itself wherever food is stored. Native to Central Asia and introduced into the United States in the early days of the country, house mice have spread to every region.

Many kinds of native mice, however, occur throughout North America. These include such interesting species as *grasshopper mice,* which feed largely upon insects; the small *pocket mice,* provided with tiny cheek pockets in which to carry the seeds upon which they feed; and species such as the *short-tailed meadow mice,* the *pine mice,* and the long-tailed *deer mice,* which, because of excessive abundance, and their habits of feeding upon grass, grain, and trunks or roots of fruit trees, may become exceedingly destructive and an expensive nuisance to farmers.

Courtesy of the Section of Fine Arts, Public Buildings Administration

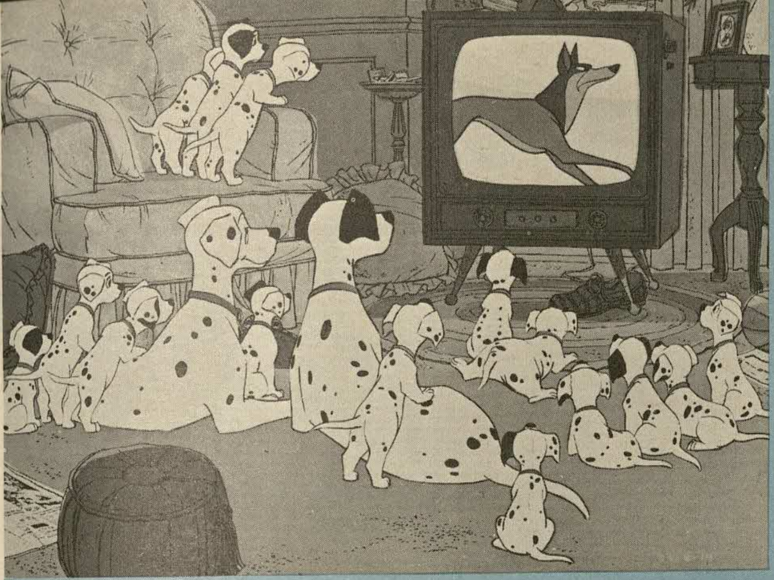
MOVING PICTURES, the greatest revolution in entertainment since the Greeks originated the drama. Pictures in motion provide amusement at low cost and reach millions of people throughout the world every day. A person may see a dramatization of a new play or a Shakespearean tragedy—a news event as it actually happened before the camera or a hilarious animated cartoon. He may even see many motion pictures, or *movies,* in his own home through television.

The world's largest movie-producing center is Hollywood, Calif., whose films are shown in thousands of theaters in the United States and also in many other parts of the world. India ranks second to the United States, and many other countries are also turning out moving pictures.

Moving pictures are shown in homes and schools, in churches, and in business meetings. They are widely used for educational purposes and have also been used for political propaganda and for advertising promotions.

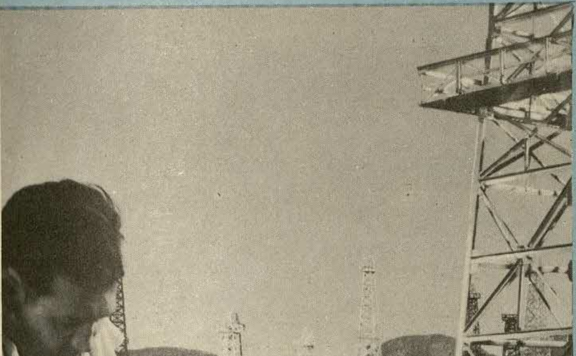
The Story of Moving Pictures. Thomas Edison, about 1889, devised the first practical apparatus for taking moving pictures. It consisted of a camera and a machine called a *kinetoscope*. The latter was a so-called "peephole" device, which presented a series of pictures arranged on a revolving belt. In 1895 the Lumière brothers patented their *cinematographe* in France, and Thomas Armat and Woodville Latham in the United States invented projectors like magic lanterns, which threw the pictures on a screen. Then came cameras which took pictures of moving objects on a roll of film, the start of modern pictures.

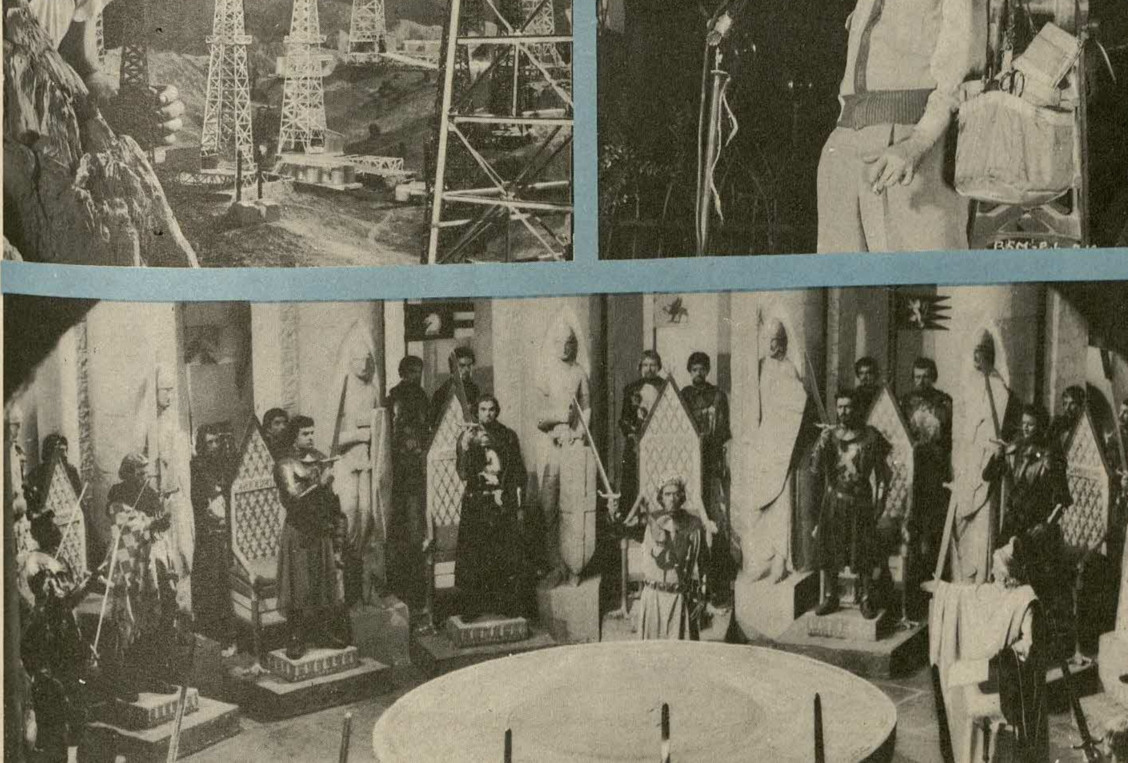
The first full-length picture *The Great Train Robbery* appeared in 1903. Stories of action and spectacular feats became popular, and such screen plays as *The Birth of a Nation* and *Quo Vadis* were outstanding successes. Great advances were made in photography and projection, but for more than twenty years moving pictures were "silent," with spoken dialogue shown as subtitles. Finally a means of using



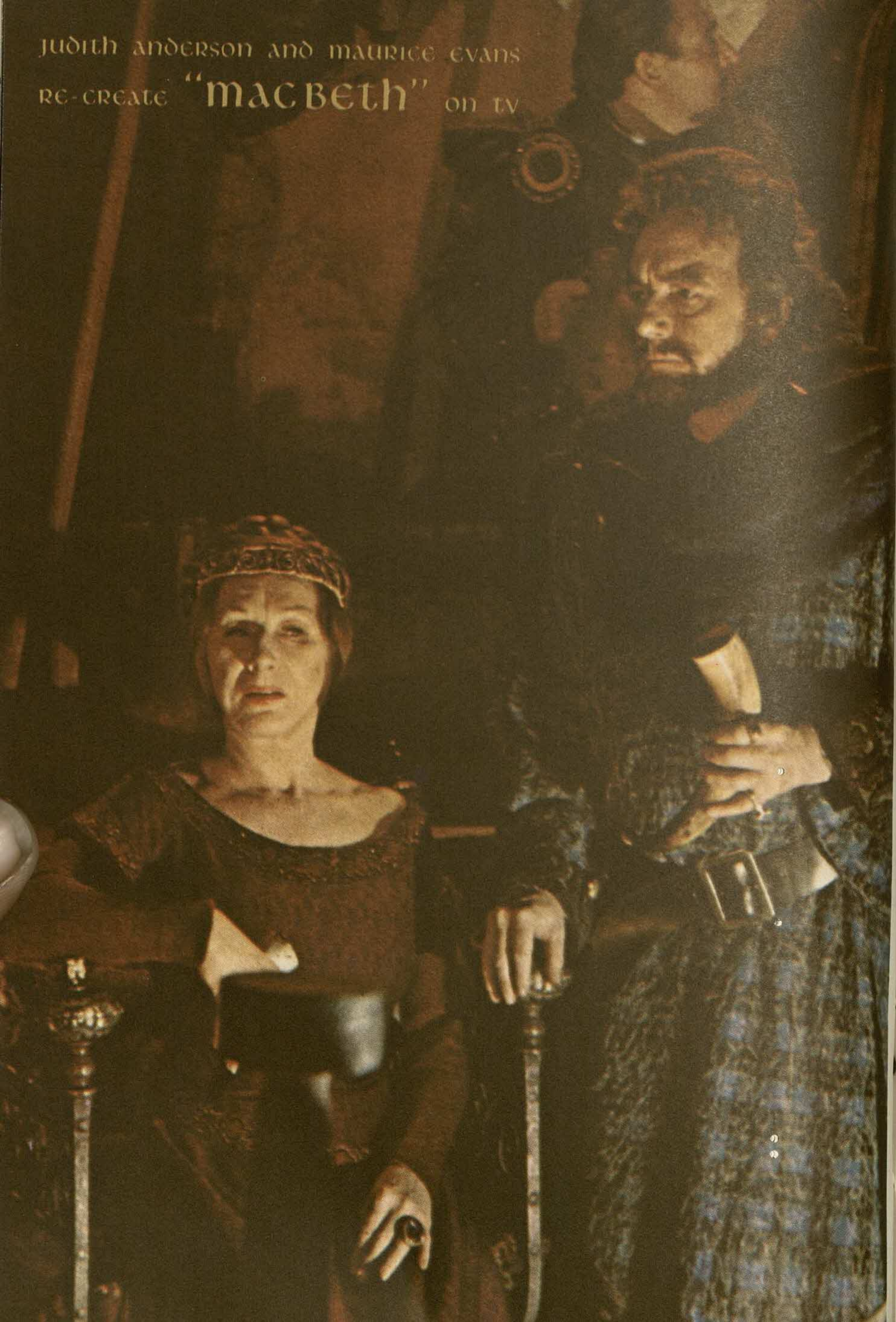
SCREEN SCENES
The animated cartoon and miniature sets seem very alive when reproduced on the movie screen, and the wide screen of CinemaScope increases the viewer's feeling of actually taking part in a scene from a play. The director is responsible for the supervision of the production to which he is assigned.

Copyright Walt Disney Productions; George Pal Productions, Inc, RKO; MGM, from "Knights of the Round Table" in CinemaScope





JUDITH ANDERSON AND MAURICE EVANS RE-CREATE "MACBETH" ON TV



Copyright 1956 Paramount Pictures Corp.

ACTORS TRAVEL TO MANY LANDS TO FILM PICTURES

Although many scenes in moving pictures are filmed in the studios, a director will often take an entire company "on location" to get the proper realism in a picture. Three months were spent filming "The Ten Commandments" in Egypt and the Holy Land, above. This scene shows the careful attention to staging and costuming. Over $300,000 went into research alone. Much of Shakespeare's "Macbeth" was filmed in a castle in Scotland, opposite page. This particular castle was selected from among many because it had the proper atmosphere for the famous classic. Good actors and expert direction as well as research are also necessary ingredients for film masterpieces.

NBC Photo from Scholastic Magazine

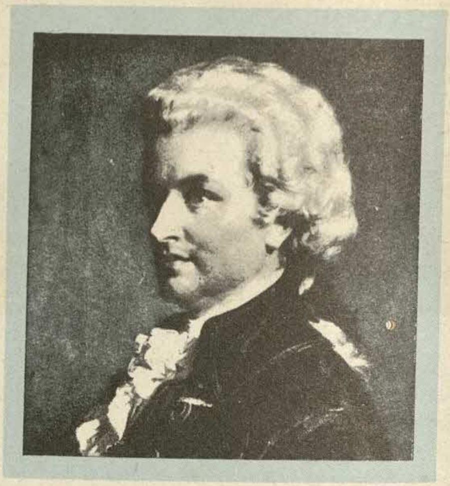
sound was perfected, and in 1927 the first full-length picture with dialogue was produced, *The Jazz Singer.* The use of sound was followed by the use of color for even greater realism. *Becky Sharp,* an all-color, full-length sound picture, was produced in 1935. A full-length animated cartoon in color, *Snow White and the Seven Dwarfs,* was exhibited in 1938.

How Pictures Are Made. Many people are needed to make a moving picture. First, the story must be written. This is usually done in conference with the writer, the producer, the director, and other officials. When the scenario is ready, the production begins. The actors and actresses are rehearsed, the scenery is built, costumes are designed, and other details are attended to. Indoor scenes are usually "shot" on a sound stage, a huge building insulated against noise. One scene at a time is filmed and recorded, and each scene is numbered. Outdoor scenes may be filmed on the studio lot where permanent settings are used as backgrounds for many pictures. Sometimes the entire company goes "on location" to the mountains, the desert, or the seashore.

Miniatures are used many times to portray graphic scenes. A picture of a ship on fire may look quite real on film, but it is actually a model a few feet high burning in a tank of water; a terrifying train wreck may be a small train running on a track in a room; airplanes crashing will be model planes. Actors often are pictured walking down a street in Paris, or riding on Broadway in New York, or standing in front of a London hotel. The backgrounds are not always real; the actors may have been photographed against screens showing these backgrounds or pictures of the actors could have been superimposed on films of the places.

Unusual "shots" are possible through the use of special lenses, raising or lowering the cameras, moving them about, and superimposing other "shots." Corn flakes are used to show falling snow; large fans are used to create a wind, and glycerine is often employed to simulate moisture, such as tears.

In sound recording, a microphone is placed above the actors to receive the sounds of their voices, which are carried by electrical impulses to a "mixing panel." Here, a beam of light is affected by the sound waves, causing the sound to be photographed on a strip of film. In the meantime, the camera is recording the visual scene on another film. These two films are developed and joined, then edited and printed. In the theater where the film is shown, the "sound track" is converted from light waves to sound waves by a photoelectric cell; the vibrations are amplified and transmitted to the audience through loud speakers at the back of the screen.



PROLIFIC COMPOSER
Brilliant Mozart composed sonatas at seven.

MOZART, *mo' tsahrt,* JOHANN CHRYSOSTOMUS WOLFGANG AMADEUS (1756-1791). Producing beautiful music of melodic, lilting brightness despite a life embittered by poverty and the hatred of his rivals, Mozart ranks among the greatest musical geniuses of all time. He wrote an unbelievable number of musical compositions, including more than forty symphonies and many concertos for the violin and piano, as well as beautiful chamber music, including string quartets and quintets and sonatas for piano and violin. His romantic operas, *The Marriage of Figaro, Don Giovanni,* and *The Magic Flute,* are performed today; and his sacred compositions include the famous *Requiem,* one of the enduring examples of classic church music.

Born in Salzburg, Austria, the young Mozart was a most precocious musician. He began studying music with his father, and at the age of five was composing minuets; a year later, he and his sister made a brilliant and successful European concert tour. At seven he was composing sonatas, and at the age of nine was able to play the difficult works of Bach and Handel. His father took him on a concert tour of Italy between 1769 and 1771. This visit had a great influence on his music, enhancing its vigor and seriousness with a note of gaiety and lightheartedness.

MUCILAGE, *mu'si laje.* Gum arabic, dextrin, and various other plant gums are used in the preparation of the sticky liquid known as mucilage. The gums are dissolved in water or other solvent, and the adhesive is marketed in large or small glass jars and in tubes. Mucilage bought for fastening photographs should be of good grade and warranted not to discolor them.

MUG'WUMP. During the last century, members of political parties who voted for candidates outside of their party ranks were characterized by this name. Republicans who voted for candidates on the Liberal Republican ticket in 1872 were called "Mugwumps." The name was particularly common during the election of 1884, when "Independent Republicans" refused to support James G. Blaine.

MUIR, JOHN (1838-1914). It was the love of John Muir for the mountains and woods and streams of the Northwest that inspired the movement to conserve America's scenic beauty and natural resources.

Born at Dunbar, Scotland, Muir was brought to America as a boy of eleven. He entered the University of Wisconsin in 1860, and after spending four years there, began his travels over the trails and waters of the unexplored West. He became famous as an explorer, geologist, and naturalist; discovered the Alaskan glacier that bears his name; wrote numerous books on his travels, and in his writings and lectures urged the establishment of national parks and started the conservation movement.

The famous Muir Glacier, which he discovered in 1879, rises from 150 to 210 feet in a vertical cliff of ice fronting for three miles on Glacier Bay. It reaches back fifteen miles into the mountains, rising probably 1,000 feet above the sea floor at its highest point, and covering 350 square miles. From steamers passing the bay, tourists can watch huge icebergs break off and plunge into the ocean.

From America, Muir traveled on to New Zealand and Australia, India, Manchuria, Siberia, Russia, Africa, and South America. Among his books are *The Mountains of California, My First Summer in the Sierra, The Yosemite, Picturesque California, Our National Parks, Story of My Boyhood and Youth,* and *Steep Trails.*

BASIS OF SILKS AND SATINS
Mulberry leaves feed the precious silkworm.

MUL'BERRY. The trees that bear this name are among the few plants that are capable of furnishing man with the three necessities of life—food, clothing, and shelter. Especially in the clothing industry is one kind of mulberry tree important, for its leaves serve as the sole food of the silkworm. The fruit of the mulberry is not a true berry, but a collective structure not unlike the blackberry or raspberry in appearance. Its taste is sweet and pleasant, and it is often made into a delicious drink. Dye, fiber, and medicinal materials are derived from mulberry bark.

Most important of the mulberries is the *white* mulberry; it is the leaves of a cultivated variety of this tree which are now used in the silk industry. The common *black* mulberry, a native of Persia, is best known for its fruit. The *red* mulberry is the typical species found in the United States. Its fruit is red and delicious, and its wood valuable for fence posts and light woodwork. The *paper* mulberry of Japan, the bark of which is used in papermaking, and the *Russian* mulberry, used in Western United States as a hedge plant, are other popular species.

MULE. Especially popular in the sunny South, the mule is characterized by his short mane, bushy tail, sharp hoofs, and long ears. Mules stand from eleven to seventeen hands high and weigh from 600 to 1,600 pounds. The animal is a hybrid, having for parents the domestic mare and the male ass, or jack. All mules are sterile and cannot reproduce. They are not a recent development, for history records that they were used by the ancient Romans and Greeks. Introduced into America in colonial times, mules are raised in large numbers today, in Missouri, Kentucky, Tennessee, Oklahoma, Texas, and other Southern states.

Mules have a number of fine characteristics. They are quiet and patient, do not frighten easily, have remarkable endurance, and are highly resistant to disease. They will neither overwork nor overeat and are, therefore, better adapted to hard labor than horses. They are much used on farms and plantations, in mines, in logging camps, and in railway construction.

MULLEIN, *mul'in.* Formerly thought to have medicinal properties, the coarse, fuzzy mullein is one of America's commonest weeds. If one touches the hairy surface of this weed, a severe itching sometimes results, especially if the plant is touched when the skin is wet with perspiration. The plant has a tall stalk and large leaves, both covered with whitish hairs, and produces a spike of yellow flowers. Since mullein is a biennial, maturing the second season, it is possible to kill off the plant by cutting the young seed stalks.

In the early days of America, housewives used mullein stalks as candlewicks, as the basis of a tea, and, when packed with clothing, in chests, as a preventive of moths.

MUL'LENS, or MULLINS, PRISCILLA. In Longfellow's poem, *The Courtship of Miles Standish,* Priscilla Mullens appears as the one beloved by Miles Standish. It is not known whether Longfellow's version is authentic, but it is a fact that Priscilla came to America in the *Mayflower* with her parents and brother, and that she did marry John Alden after her family had died during the first winter. Longfellow was a descendant of John and Priscilla. See ALDEN, JOHN.

MUL'LET. The most important food fish of the South is the mullet, a fish that averages about a foot in length but may reach a length of two feet and weigh twelve pounds or more. As a rule, it is found in shallow salt water or in fresh water, and its food is chiefly the vegetation of muddy bottoms. The most important species is the *striped* mullet, known on both the Atlantic and the Pacific coasts.

MUL'TIGRAPH. See COPYING DEVICES.

MUM'MY. Dry and musty tombs in Egypt hold the bodies of men and women who died centuries ago. Known as mummies, these bodies have been preserved by a special process of embalming, and are found adorned with gilt and other decoration, and with gold and silver ornaments. Mummies usually repose in painted and carved coffins, inscribed with hieroglyphics that are a valuable source of personal and ancient historical information.

Most of the mummies dug up in Egypt are those of persons who were rich. When a wealthy person died, the Egyptian embalmers removed the internal organs, then washed and salted the body and soaked it in a strong natron solution. After washing the body again, the embalmers filled it with preservatives and wrapped it in linen bandages, carefully enveloping each finger and toe and the legs and arms. They finally encased the entire body with a thick layer of rolled linen. For the head, muslin was first glued to the skull and face; then additional layers were glued on top. The mummy was then usually gilded or painted.

The bodies of those of the poorer classes were not embalmed so elaborately. Instead, they were merely dried with natron, then wrapped with cloth and placed in catacombs. Sometimes the Egyptians mummified their cats, bulls, ibises, fish, apes, and crocodiles.

A few mummies also have been found in Mexico and Peru, although they are not nearly so well preserved as are Egyptian mummies. Occasionally, bodies of persons are found in a natural mummified state, having been preserved by the dryness of the air.

MUNICIPAL, *mu nis′e pal,* **GOVERNMENT.** Each city or town has its own form of government, which maintains order, passes laws called ordinances, and has charge of the general welfare. A municipality, whether it be a town or a city, is usually chartered by the state as a governing body independent in some respects, but as a whole responsible to the state for its conduct, particularly in matters of justice, sanitation, and education. In some cases, by legislative enactment or constitutional amendment, a city is granted home rule, or power to frame its own charter.

Forms of Municipal Government. In the early colonies, the town meeting, a common assembly, was the governing body, but today there are three major types of city administration: the mayor-council form, the commission form, and the city-manager type.

Large cities are divided into wards which elect representatives called aldermen, who make up the city council. The mayor is the executive officer, representing the city and carrying out the legislation of the council (see MAYOR). In a village there are no wards, but voters choose a village president and several trustees. The commission and manager types of government are described in the articles COMMISSION FORM OF GOVERNMENT; CITY MANAGER.

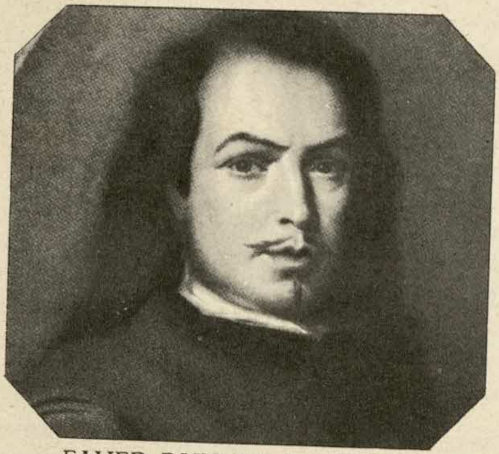
MUNICIPAL OWNERSHIP. The past century has witnessed a trend toward municipal ownership and operation of certain businesses and facilities. The term municipal ownership is most frequently used in reference to a city's operation of such public utilities as waterworks, electric-power plants, and street railways.

Evidence of the growth of public ownership may be seen in the records for waterworks. In 1800 there were fifteen private waterworks and one public plant in the United States. By the close of the nineteenth century, there were 1,700 public plants and 1,500 private ones. Today, thousands of waterworks and electric-lighting systems are owned by cities.

Municipal ownership of public utilities is quite common in Great Britain, Ireland, and Canada. See GOVERNMENT OWNERSHIP; PUBLIC UTILITIES.

MURAT, *mu rah′,* JOACHIM (1767-1815). Brother-in-law of Napoleon, marshal for the emperor in his military campaigns, king of Naples, Joachim Murat had a career which closely followed that of the "Little Corporal." Born at La Bastide-Fortunière, France, Murat entered upon a military career and became a general in Napoleon's wars in Egypt and Italy. Following his marriage with Caroline, Napoleon's sister, he received many titles, including Marshal of the Empire, Grand Admiral, and Prince of the Imperial House. He fought at Austerlitz, Jena, Eylau, and Friedland, and in 1808 was proclaimed King Joachim I of Naples.

Murat shared in the disastrous and terrible march and retreat in Russia, but deserted the standard of Napoleon after the Battle of Leipzig. In 1815 he again went to Napoleon's aid, but after Waterloo, was forced to leave Italy. When he attempted to return to his throne, he was captured, tried, and executed.



FAMED PAINTER OF SEVILLE

Murillo, painting a mural in a Cadiz church, fell from his scaffold, was mortally hurt.

MURILLO, *moo reel′ yo,* Bartolomé Esteban (1617-1682). A leading Spanish artist, Bartolomé Murillo was known particularly for his Madonnas and paintings of the Holy Family. His work is admired not only for its technical excellence, but also because of its note of religious idealism. During the early part of his career, Murillo painted subjects of everyday life, but during his later years he devoted himself mainly to Biblical themes.

The artist was born in Seville, the son of a humble Spanish artisan. In 1642 he went to Madrid, where he made the acquaintance of Velasquez, who secured for him permission to paint in the Royal Gallery. His work soon came to public notice and fame, and commissions came his way. After three years, Murillo returned to Seville, where he remained for the rest of his life. He established the Academy of Seville, out of which grew the Seville School of painters.

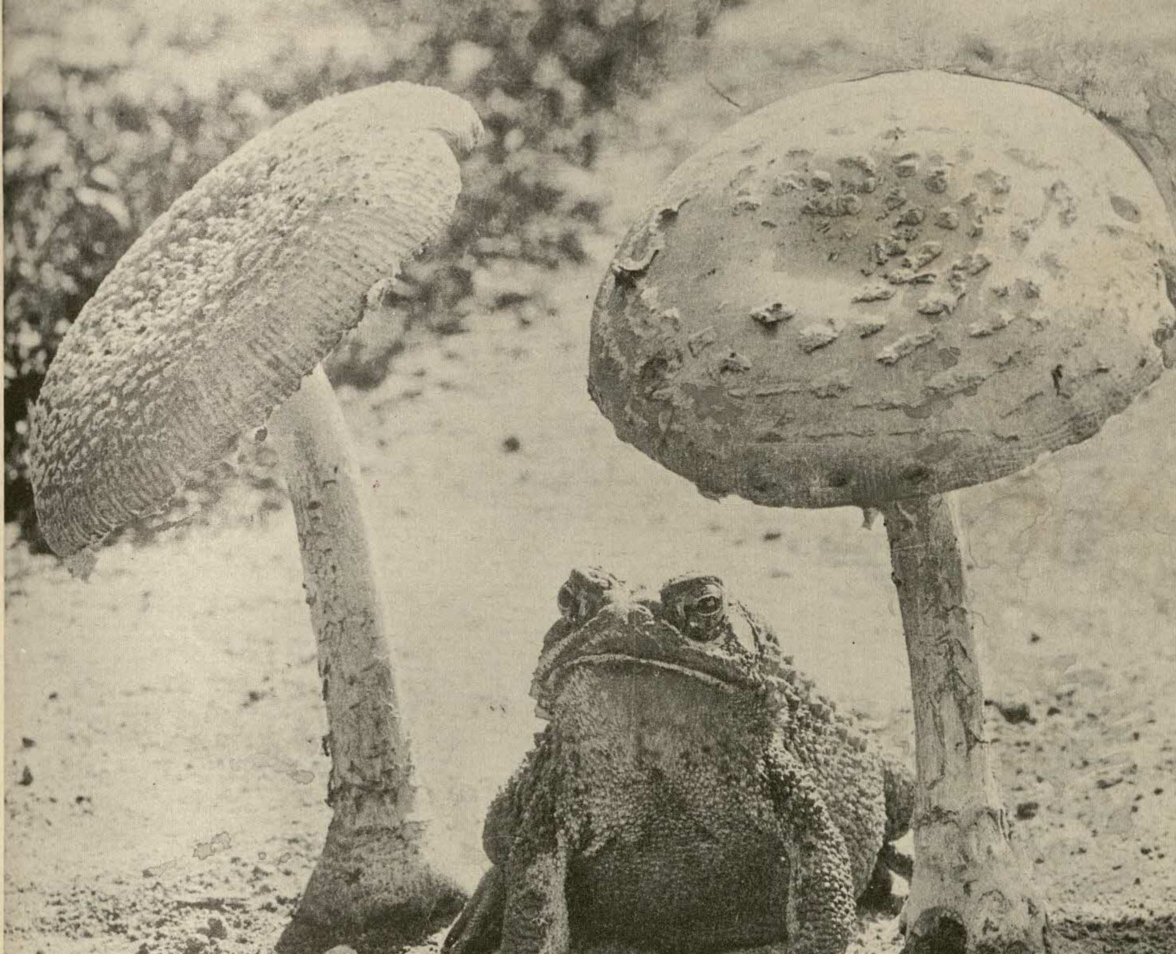
One of Murillo's favorite subjects was the *Immaculate Conception,* which he painted no less than fifteen times. Among his other religious works are *Moses Striking the Rock, The Miracle of the Loaves and Fishes, Return of the Prodigal,* and *The Holy Family.* Murillo's paintings are to be found in galleries throughout Europe and in America, but most of his better paintings are in Seville and in the Prado at Madrid.

MUSCLE, *mus′ ′l,* **or MUS′CULAR TIS′SUE.** Nearly all the movements of the body are accomplished by means of the muscles, which produce their effects by contraction under the influence of impulses conveyed to them by the nerves.

Kinds of Muscles. There are two principal varieties of muscles, the *voluntary* and *involuntary.* The former act under control of the will; the latter respond to impulses set up by the sympathetic nervous

MOTORS OF THE BODY

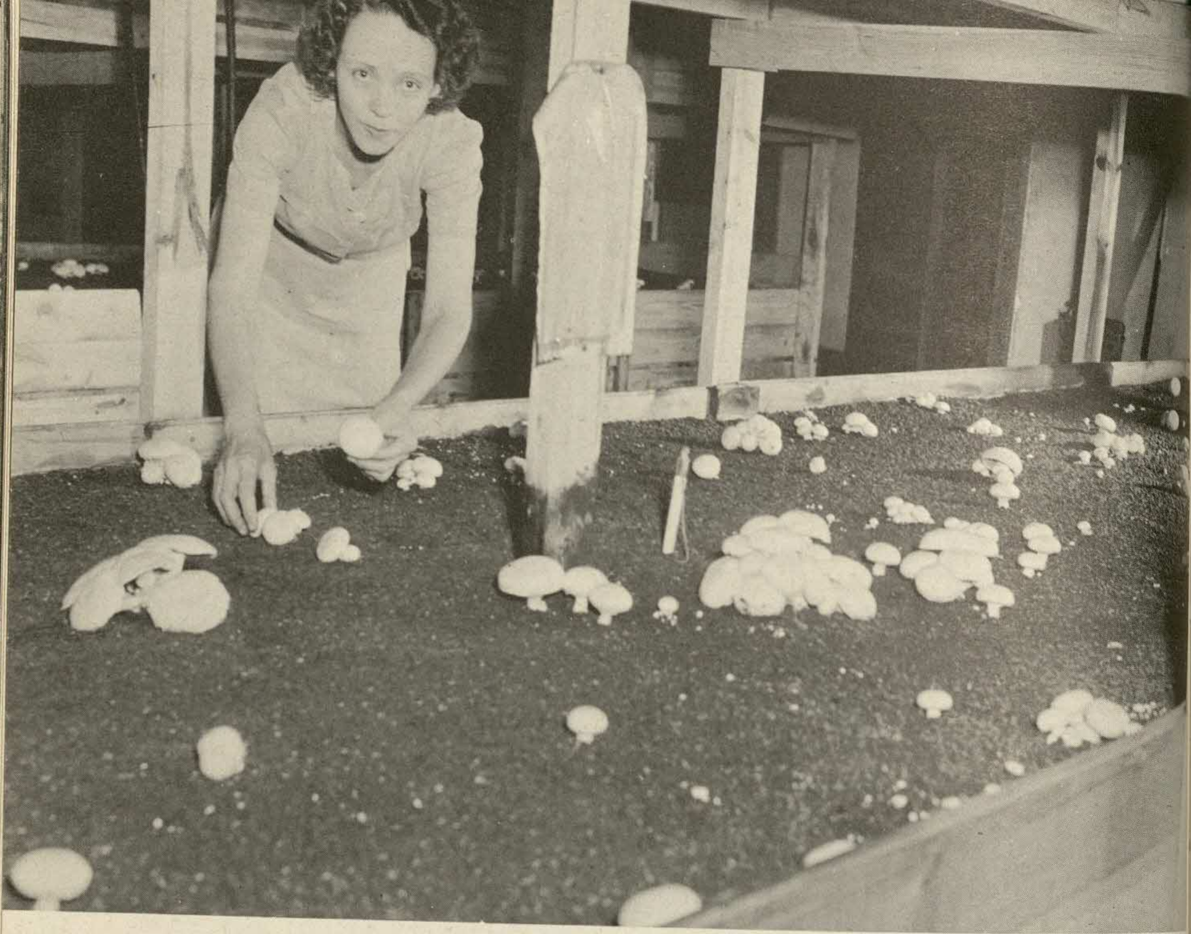
The more than 300 muscles in the human frame contract and relax to move the joints.



UPI

TOADSTOOLS SHELTER SATISFIED TOAD

Sitting in the shelter of two inedible toadstools, a grandfather toad appears unaware that he's still in the blazing sunshine. His expression seems to indicate that he's happy between the toadstools and wants to be left alone.



U.S.D.A.

THE VEGETABLE HALF OF A FAVORITE DISH—STEAK AND MUSHROOMS

A mushroom grower at New Smyrna Beach, Fla., looks over a new crop springing up in recently seeded bed, above. Mushroom culture may be carried on in barns, sheds, cellars, and caves. During the past twenty-five years, production has increased from an average of one-half pound per square foot to nearly two pounds. Total annual production in the United States exceeds 65,000,000 pounds. Below, one of the most popular varieties of mushrooms is the Snowhite.

system, now often called the *autonomic nervous* system. Voluntary muscles are made up of spindle-shaped cells, each of which has a sheath of connective tissue called *sarcolemma.* The voluntary muscles are marked by *striae* and are called the *striated* muscles. These muscles are attached to bony structures of the skeleton in such a manner as to produce, by their contractions, a certain amount of leverage.

The involuntary muscles, with one exception, are not striated, and are called *smooth* muscles; the exception is the muscular structure of the heart, which, although striated, is not under control of the will. The voluntary muscles have a much wider range of motion than the others, and each set is associated with an opposing one; each has its origin at some fixed point, and is inserted at some other point where motion is to be produced. Insertion is often effected by means of a tendon composed of inelastic fibrous tissue; and some tendons spread out in broad sheets, as in the walls of the abdomen and in the scalp.

MUSCLE SHOALS. One of the greatest power projects in the world is located at Muscle Shoals, a rapids in the Tennessee River near Florence, Ala. It was undertaken during World War I for the manufacture of nitrates. Wilson Dam is at the rapids' west end; Wheeler Dam, at the east end. In 1933 the project became a part of the Tennessee Valley Authority (TVA) project. See TENNESSEE RIVER; TENNESSEE VALLEY AUTHORITY; WATER POWER.

MUSES, *mu' zez.* The ancient Greek legends tell of the Muses, goddesses who were the patrons of the arts and sciences and who sang for the pleasure of the gods about the valorous deeds of gods and men. Originally they were nymphs of the springs. There seem to have been three such goddesses at first, later nine. The nine Muses were Calliope, epic poetry; Euterpe, lyric poetry; Melpomene, tragedy; Erato, love poetry; Thalia, comedy; Polyhymnia, sacred poetry; Terpischore, choral song and dance; Urania, astronomy; and Clio, history.

MUSE'UM. Any collection of interesting and classified objects relating to science, art, history, or other branch of knowledge is a museum. The word originally had reference to a sanctuary, or temple, of the Muses, the goddesses of poetry and of the arts and sciences. Later, it came to be applied to a place dedicated to the study of the higher branches of learning. One of the first museums of this kind was that established at Alexandria, Egypt, by Ptolemy Philadelphus, in the third century before Christ.

The predecessors of the modern museum were the small private and public collections of objects in natural history, science, and art called *cabinets,* of which the State Cabinet of Natural History in Albany, N. Y., is an example. Some of the large public museums were established as the result of expositions. For example, the first building of the United States National Museum at Washington was erected to hold exhibits that had been on display at the Centennial Exposition held in Philadelphia in 1876. The National Museum of the United States, described elsewhere under that title, contains collections relating to art, natural history, and the development of man.

Oberlin College

MUSHROOM MAGIC

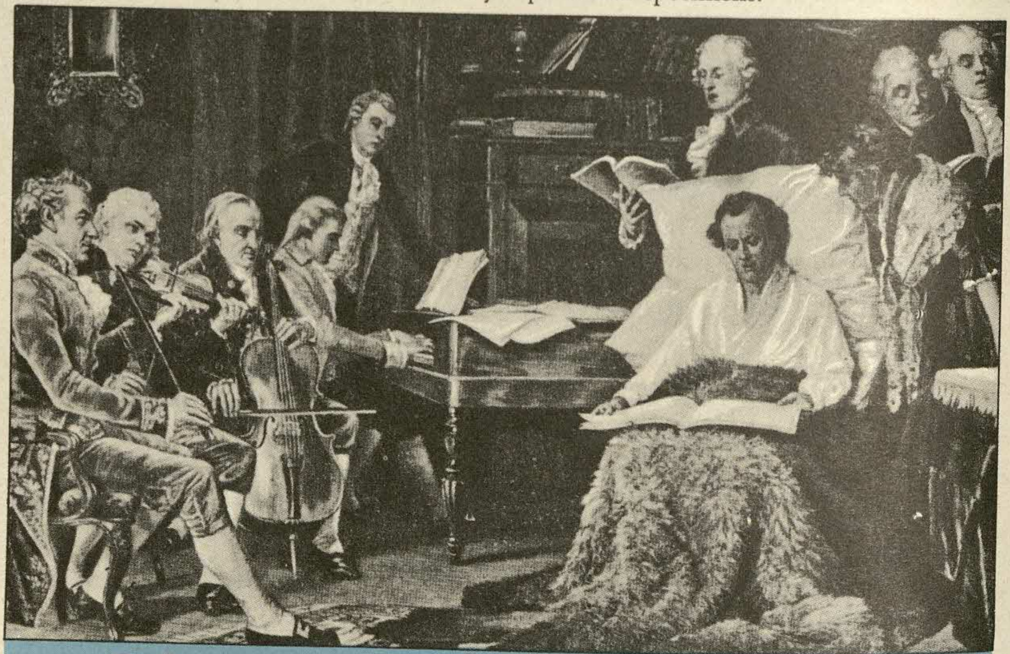
Spores, not sprites, account for this fairy mushroom ring in hot, sticky weather.

MUSH'ROOMS. A peculiar growth of fungi often reaching an amazing size in a single night, mushrooms are found in nearly all parts of the world and may be either edible or poisonous. Because of this fact, mushrooms for eating should be selected only by those able to distinguish between the two types.

An ordinary mushroom consists of two parts: the *spawn,* or vegetative part, and the *fruiting* part, which is used as food. Only the rooty portion is included in the spawn; the cap, gills, ring, and stem are all edible when properly prepared. The cap is the top or "umbrella" part of the ordinary toadstool form of mushroom; the gills are the whitish or pinkish, vaned portion underneath; the ring is the growth around the stem just beneath the gills, and the stem is the supporting part of the plant. Mushrooms take a great variety of shapes and colors.

The cultivated varieties are usually known as *pink-gilled* mushrooms, while in wild state there are *coral* mushrooms, *oyster* mushrooms, *beefsteak* mushrooms, *sulphur* mushrooms, *ink-cap* mushrooms, and the popular *sponge* mushroom. *Puffballs* are another variety of edible mushroom, but must be used before the inside turns yellow.

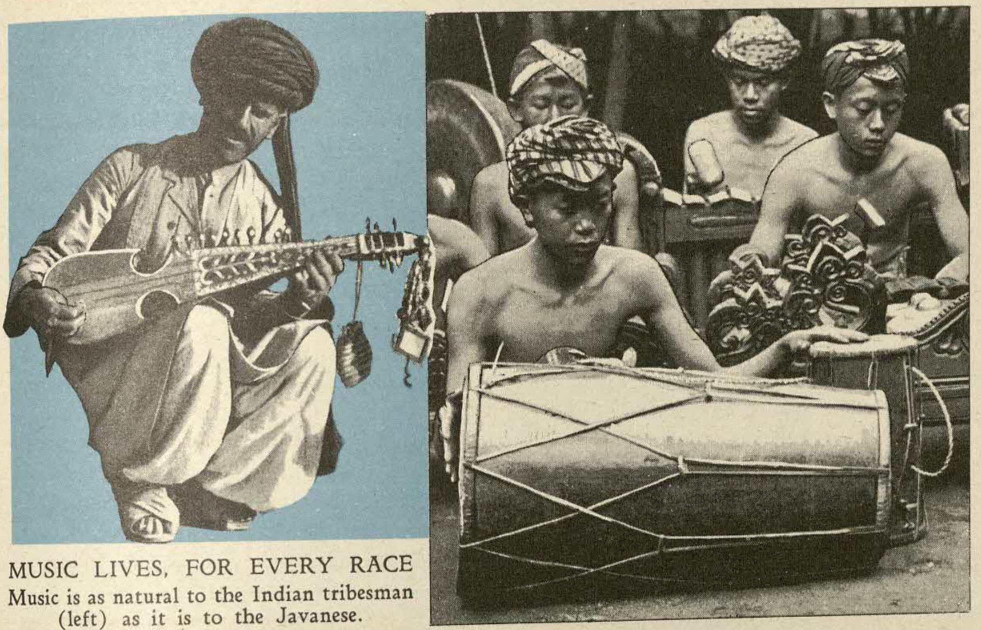
The sponge mushrooms spring up in the warm, damp days of April or May, and must be gathered immediately or they will shrivel and disappear. The other wild forms may be found at varying times from June through late October. There are no positive and unfailing rules for identifying poisonous wild mushrooms. The study of books and government bulletins is helpful, and the United States Department of Agriculture is always glad to identify particular specimens.



The Golden-Tongued Art

MU'SIC. It has been truly said that music is man's universal language. It has been a part of his life wherever he has lived and is found throughout the world—from the grass hut of the African savage to the living room of an American farmhouse; from the tent of a Mongolian nomad to the great concert halls of European cities.

Naturally, not all music is the same. The



MUSIC LIVES, FOR EVERY RACE
Music is as natural to the Indian tribesman (left) as it is to the Javanese.

beat of the tom-tom in the jungle is pure invention, springing from man's innate sense of rhythm, but the great symphonies possess all the refinements of civilization. For primitive music contains only two of the three elements of music—rhythm and melody. The third element, harmony, is a product of the science of music.

Fundamentals of Music. An understanding of music is not so difficult as it may seem. We may be overawed at Beethoven's genius which could produce such a work as the *Ninth Symphony;* but if we study this work with a knowledge of the fundamentals of music, we begin to understand how it could be written and thus can appreciate some of its true beauty.

First of all, it must be remembered that music is based on sound, that all sounds are vibrations, and that the pitch of sounds is determined by the number of vibrations per second. In music, these sounds are known as tones, or notes, and each tone has a certain number of vibrations. A series of these tones, separated by intervals in the number of vibrations, comprises a scale; and the scale in common use consists of eight notes, separated by five large intervals and two smaller intervals. This scale is known as the *diatonic* scale. The *chromatic* scale is a further division of tones, dividing the diatonic scale into thirteen semi-tones separated by almost equal intervals from the standpoint of the number of vibrations. The extra notes are the sharps and flats, the black keys on the piano.

A scale can begin on any note, the one on which it starts determining the key. If there is an interval of two tones between the first note and the third, the key is *major*. The *minor* keys are classified as *harmonic* and *melodic*. The so-called *relative minor* refers to the scale beginning on the sixth tone of a major scale; for instance, *A minor* is the relative minor key to the key of *C major*.

When written, the notes are arranged on a staff of five parallel lines. These notes, besides signifying the tones, also denote the values, and are written as whole notes, half notes, quarter notes, eighth notes, sixteenth notes, and so on, in measures. The beat, or time, of the particular composition is indicated at the beginning of the piece, as 4/4, 3/4, 6/8. The simplest compositions are in 4/4 time, meaning that there are four beats to the measure and that a quarter note receives one full beat.

In 3/4 time, or waltz time, there are three beats to the measure, and the quarter note receives a full beat. In 6/8 time, there are six beats to the measure and an eighth note receives a full beat.

Presenting Music. There are two ways to present music: vocal which is sung, and instrumental music, played on an instrument. Some of the most common forms of vocal music are the art song, ballad, aria, hymn, chant, chorus, oratorio, and recitative. Instrumental music includes the symphony, tone poem, concerto, suite, overture, and sonata.

Musical Instruments are divided into four classes: *percussion,* those that are struck, such as the piano, drums, tympani, cymbals, and xylophone; *strings,* which are played by vibrating strings, as the violin, viola, violoncello, and bass viol; *wood winds,* played by blowing on a reed or across an opening, as the flute, oboe, clarinet, English horn, saxophone, and bassoon; and the *brass,* metal instruments played by blowing into a circular mouthpiece, such as the cornet, trumpet, trombone, French horn, and tuba.

An orchestra includes all types of instruments; but in a band there are no strings. An opera combines instrumental and vocal music. The best-known type of small instrument groups is the string quartet.

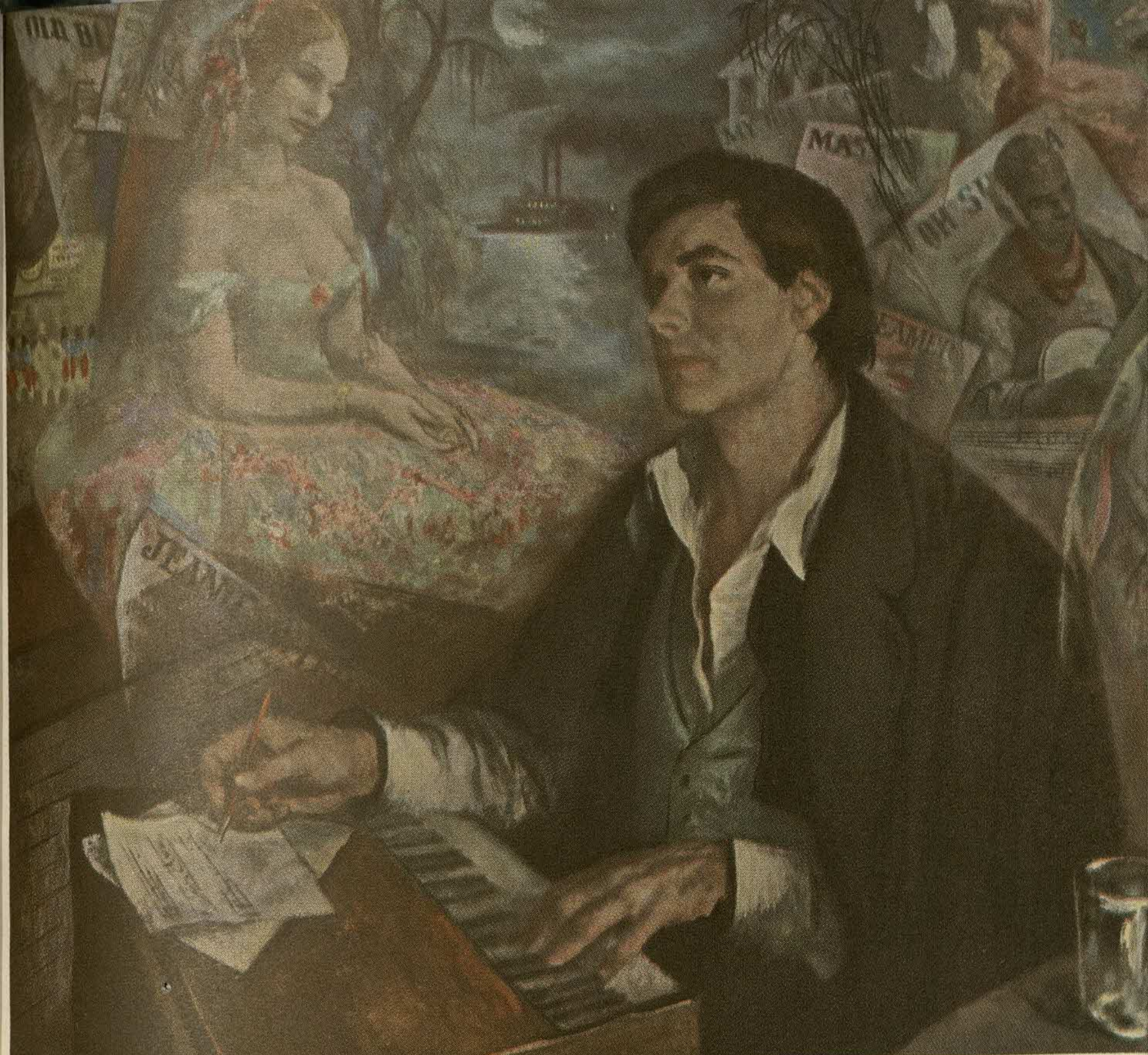
Growth of Music. In ancient times, men blew on rams' horns and on reeds, plucked lyres, and sang songs. The Greeks were lovers of music and also studied it as a science. Folk songs existed as far back as the sixth century B.C.

Saint Ambrose, who lived in the fourth century, is the first man we know of who recorded music. The scale of eight notes and the Gregorian chant came two centuries later. Guido d'Arezzo was the first to systematize the scale in the eleventh century. Harmony, counterpoint, and polyphony also came into being at about this time. Forerunners of modern music include Pierluigi da Palestrina who developed harmony and polyphony, and Claudio Monteverdi who wrote the first opera and overture.

Music was confined mostly to Italy up to the eighteenth century. There were folk songs in every country, however, and Henry Purcell wrote many beautiful English songs in the seventeenth century. But music had received little encouragement in other parts of Europe. In the eighteenth century, however, music reached its highest development in Germany, led by Johann Sebastian Bach. No later composer attained Bach's mastery of counterpoint and the art of polyphony. George Frederick Handel, who lived at the same time, wrote oratorios, particularly *The Messiah,* that have never been surpassed. Franz Joseph Haydn followed and did much to improve the symphony. He was the master of the theme and variation form of composition dominant in the so-called classical school of this time. Christoph Gluck, another eighteenth-century German, gave new life and direction to the opera. Wolfgang Amadeus Mozart also belonged to this period. His compositions, as brilliant today as when played in the royal courts of Europe, brought music to a new peak of artistic achievement.

Ludwig van Beethoven, one of the world's greatest musical geniuses, appeared next. He began where Mozart left off and his spirit lives today wherever men put notes on paper or listen to music. He developed the symphony from a rather short, pleasant arrangement of well-organized tunes to the stupendous interpretation of life that it now represents. He used the improvement in instruments to create new effects, brought the sonata form of composition to its maturity, and set the mode for instrumental composers for the remainder of the nineteenth century.

But the symphony was not the only achievement of the early nineteenth century. Music, until then, had been pure and absolute, written only for its own beauty. Hector Berlioz, however, had a new use for it—to tell a story. He was the first to develop program music, written to interpret a story or a poem. Symphonic, or tone, poems came from this idea. Franz Liszt and Camille Saint-Saëns wrote many tone poems.



John Hancock Mutual Life Insurance Co.

MUSIC SPEAKS TO EVERYONE

To Stephen Foster, above, it spoke of simple melodies that have been popular for generations—*Oh Susannah, Suwannee River, Old Black Joe,* and his famous love song *I Dream of Jeanie with the Light Brown Hair.* Music makes a bond between people, too. The baby, left, may not understand the notes his dad is playing on the trombone, but it is obvious he enjoys it. To the child, music means security, happiness, and love. Music is for everyone and knows no age limits.

Equitable Life Assurance Society

American Music Conference; Standard Oil Co. (N.J.)

GROWING UP WITH MUSIC IN THE MODERN SCHOOL

From play-pen days, children love rhythm, and in nursery school they already have their favorite recordings. In the grades they are able to form their own bands and orchestras.

The new developments in composition and the continued improvement in instruments brought many types of music to the fore. We find the art song perfected by the unhappy Franz Schubert; the romantic aspect developed by Mendelssohn, Von Weber, and Schumann; lyric opera developed into magnificent presentations with Verdi, Rossini, and the other Italian composers; German opera made into music drama under the almost superhuman Wagner; and the piano given a leading place in the instrumental field with Chopin and Liszt. Later came Bruckner, who put the Wagnerian touch into symphonies; Johannes Brahms, who continued the power and spiritual significance of the Beethoven symphony; Tschaikovsky, who gave to the symphony a dramatic touch; and Anton Dvorak, who first saw the possibilities in native American music.

Later came the modern composers who sought new fields to conquer. Debussy, d'Indy, Saint-Saens, Ravel, and Honegger made the French school one of unexcelled orchestration; Moussorgsky and Rimski-Korsakov brought additional glory to Russian music. Stravinsky followed, to become one of the outstanding modernists. Jan Sibelius created symphonies of intense emotional appeal, and Richard Strauss gave the tone poem new beauties.

American Music. The United States has borrowed much from Europe in musical composition, and so far has produced few composers of note. It has, however, been the leader in bringing music to the great mass of people; and with radio, the phonograph, musical pictures, television, the great orchestras, and the opera companies, the music of the masters has been made available to a vast audience.

The one significant contribution to musical literature from America has been made by the Negro, although cowboy and mountain music are considered additional possibilities. From the Negro has come the spiritual, which, with its rich and strange beauty and unusual rhythm, has been a new and vital force in music. It has given rise to the *blues* as well as to *jazz* and its counterpart, *swing,* all of which are typically American forms. George Gershwin was the outstanding American composer to utilize this native American music, although there are a number of composers who have applied it to the technique of the European schools. Some other American composers of note are Stephen Foster, John Alden Carpenter, Edward MacDowell, Deems Taylor, Louis Gruenberg, Roy Harris, and Aaron Copland.

Consult the following titles for additional information:

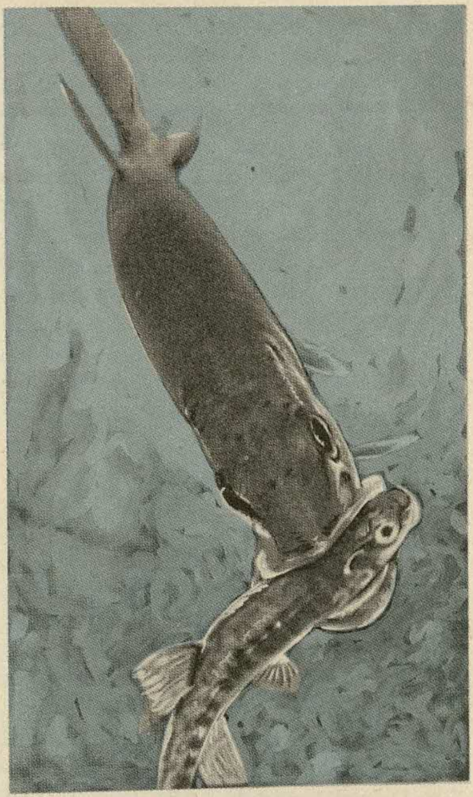
Accordion
Bagpipe
Banjo
Bassoon
Bugle
Cantata
Castanets
Chord
Chromatic
Clarinet
Concertina
Cornet
Drum
Fife
Flute
Guitar
Harmonics
Harmony
Harp
Horn
Key
Mandolin
Oboe
Opera
Oratorio
Organ
Piano
Scale
Sound
Tone
Treble
Trombone
Trumpet
Viol
Violin
Violoncello

BIOGRAPHY

Bach, Johann
Beethoven, Ludwig
Bizet, Georges
Brahms, Johannes
Chopin, Frederick F.
Dvorak, Anton
Elman, Mischa
Foster, Stephen C.
Gluck, Christoph
Gounod, Charles F.
Grieg, Edvard H.
Handel, George F.
Haydn, Franz Joseph
Herbert, Victor
Humperdinck, Engelbert
Liszt, Franz
MacDowell, Edward A.
Mendelssohn-Bartholdy, Felix
Mozart, Johann
Offenbach, Jacques
Paderewski, Ignace Jan
Palestrina, Giovanni
Rossini, Gioachino
Rubinstein, Anton G.
Schubert, Franz
Schumann, Robert
Strauss, Johann
Strauss, Richard
Sullivan, Arthur S.
Tschaikovsky, Peter
Verdi, Giuseppe
Wagner, Wilhelm Richard

MUSK. A reddish, powdery substance, musk is obtained from a gland in the musk deer. It is important commercially as a base for perfumes. It is also used occasionally in medicines. See PERFUMES.

MUSKELLUNGE, *mus'kel unj.* Voracious and pugnacious, the muskellunge is the "tiger" among the game fish of the Great Lakes region of North America. It is highly prized as an angling trophy and a food fish.



FRESH-WATER GANGSTER

Bold, hungry muskellunge may grow to weigh eighty pounds, consume tons of other game fish.

"Muskies" have habits much like those of the pike and pickerel, which are of the same genus. Muskellunge have no scales on the lower half of the side of the head, and in this respect differ from pickerel and pike. Their food is composed largely of other fish; and it was estimated by David Starr Jordan and Barton W. Everman that eight pounds of muskellunge represent several tons of minnows, whitefish, and the like.

A thirty-five-pound muskellunge has been known to produce 265,000 eggs, each one-eleventh inch in diameter. The eggs are laid in shallow water among weeds, and are not cared for in any way by the parent fish. They are laid during the period between April and July. It is rather difficult to raise muskellunge in hatcheries, as the young fish do not hesitate to eat one another.

MUSK'MELON. A popular and luscious member of the gourd family, the muskmelon is so-called because its rind gives off a delightful aroma reminding one of musk. The melons are sometimes incorrectly called *mushmelons*. Some people refer to all muskmelons as *cantaloupes*, although the name more specifically applies to the hard, small, football-shaped melons, like the Rocky Ford. Actually, true cantaloupes are found only in Europe. Another popular type is the *nutmeg* melon, which has a softer rind, more or less netted.

Muskmelons, like other members of the family, grow on vines and thrive best in slightly sandy, well-drained soil, rich in humus. As a rule, the muskmelon must be used during the growing season; but the *casaba, honey dew,* and certain other winter varieties of melons will keep for several weeks.

MUSKO'KA. Lying along the heavily timbered and lake-dotted shore of Georgian Bay in Central Ontario is Muskoka, a beautiful region of some 4,000 square miles. Included in this area is Muskoka County. Of the many lakes, three are outstanding: Muskoka, twenty miles long; Rousseau, twelve miles long; and Joseph. All three are joined with one another and have steamer service during the summer. This region is rich in game and fish and is a paradise for hunters and fishermen during the warm months. Several beautiful waterfalls add to the charm of the region.

MUSK OX. This odd creature combines, in appearance and habit, many of the characteristics of buffaloes and sheep. The musk ox seems to be the last remnant of a race that once occupied Arctic regions of America, Europe, and Asia. Its present range is confined to the northern portions of the Barren Grounds (treeless plains) of Canada, and islands to the north and east as far as Greenland.

Musk oxen are easily distinguished from other animals of North America by the massive head, which in the male bears heavy horns meeting at the middle line and tapering outward and downward, but curving upward toward the end; and by the short neck, humped shoulders, and rounded body supported by short, stout legs. A fine, woolly undercoat, covered by a dense coat of long hair which hangs from the neck and down the sides like a fringe almost to the feet, serves to protect the animals from the intense cold. Their food consists of the leaves and twigs of the willows, grass, moss, and lichens which grow in the regions they inhabit. Their name refers to the strong, musky odor of the animals.

MUSK'RAT. This well-known American fur bearer resembles in general form the large meadow mouse, but is many times larger. The animal is dark brown above, but it shades to a lighter color on

DEFENSIVE MUSK OXEN

NESTING MUSKRAT

the sides and underparts. The body is heavy, the legs are short, with partially webbed hind feet, and the tail is nearly naked, scaled, and flattened on the sides. The fur is thick, consisting of the longer projecting guard hairs and a soft, wooly underfur which effectively excludes water.

Muskrats in great abundance inhabit the marshes, ponds, and streams practically throughout the United States, and are to be found far northward in Canada. As high as thirteen young may be born in a single litter, and several litters may be produced each season by a pair of muskrats. This fact accounts for the persistence of large numbers of animals, in spite of the millions that are trapped each year by boys and men to secure the pelts when they are prime for market.

The pelts are tanned, dressed natural, and made up into garments, or they may be clipped and dyed to resemble sealskin. Dyed muskrat was sold as Hudson seal until Congress outlawed the name in 1951.

The habits of these creatures are most interesting. It is well worth one's time to study their thatched houses built of reeds, cattails, and other marsh plants, and their underground tunnels which lead to deep, open water or to the snug, warm nest chamber in a high bank above the water level. It is equally interesting to watch them as they gather the roots and stems of cattails, reeds, and other aquatic plants and tow them to some point for eating or storage; or as they dive quickly and bring up fresh-water mussels to vary their diet. They are also fond of certain cultivated fruits and vegetables.

MUSSEL, *mus' 'l.* In the shallow bottoms of fresh-water lakes and streams we often find oval shells which we call *clam shells,* but which are in reality mussel shells. Like the clam, the mussel is a bivalve, a small, soft-bodied animal protected by a two-halved, hinged shell (see MOLLUSCA). Mussels also are found in the ocean. The salt-water specimens, too, are bivalves, but are not of the same species as the fresh-water mussel.

The fresh-water mussel is extremely valuable because its shell is the source of the so-called *pearl* buttons. Thousands of people in the states drained by the Mississippi River make their living in the mussel industry, which produces millions of dollars' worth of buttons each year. Pearls are frequently found in mussels, but they are usually of no great value.

Two species of the sea mussel, the *common* mussel and the *horse* mussel, are edible. There is also a *boring* mussel. Hundreds of millions of pounds of sea mussels are eaten annually in Europe.

MUSSOLINI, *moos so le' ne,* BENITO (1883-1945). The first European dictator of this century, and the model for those who followed, was Benito Mussolini, who created Fascism and ruled Italy for twenty-one years. At the height of his power, he dictated the lives of millions, but he died the death of a traitor to his own people.

He was born in Predappio in the province of Forli; his father was a blacksmith and his mother a schoolteacher. He, too, became a teacher, but soon gave up that profession and went to Switzerland, where he took courses while working as a manual laborer. His radical tendencies were already in evidence and caused him to be expelled from Switzerland and, later, from Austria.

Upon his return to Italy, he became editor of *Avanti,* the official organ of the Socialist Party. In World War I, he urged the Allies' cause and enlisted in the army; he left it in 1917 as a corporal, having been wounded. The paper he had founded in 1914, *Il Popolo d'Italia,* he now used for socialistic propaganda.

In 1919, he organized a band of ex-soldiers into black-shirted Fascists. The Fascist Party was organized in 1921. Then, in October, 1922, 50,000 Fascists marched on Rome, forcing the Cabinet to resign; the king then had no choice but to appoint Mussolini as Premier of Italy and to permit him to set up a Fascist government (see FASCISM). Within three years he had become *Il Duce* (the leader) and dictator.

IL DUCE—FASCIST DICTATOR

Then, for a time, Mussolini benefited Italy. He brought peace with the Vatican (see Vatican City). He greatly improved highways and railroads, enlarged the merchant marine, built aqueducts and other public works, drained the Pontine marshes, colonized Libya, and began to restore Rome. In the meantime, he had built up the army and air forces, and allied his state with Germany and Japan.

In June, 1940, Mussolini brought Italy into the war in time to share the downfall of France, and in December, 1941, he declared war on the United States. Two years later, his country was at the brink of destruction. On July, 1943, Mussolini was forced to resign as Premier, and was imprisoned by his political opponents. Germans rescued him, and his good friend and onetime disciple in dictatorship Adolf Hitler set him up as head of a republican Fascist government in Northern Italy, to stem the advancing Allied invasion. The collapse of German resistance in Italy caused him to attempt to flee to Switzerland. He was seized near the border by Italian Partisans on April 28, 1945, and, after a brief trial, was executed. See Italy; World War II.

MUS'TARD. Among the cultivated forms of mustard are four chief species: *black, white, brown,* and *Japanese* mustards. White mustard is a green plant with branching stems covered with bristling hairs. It produces yellow flowers and small seed pods. Both brown and white mustard seeds produce a large percentage of mustard oil, valuable as a medicine. Black mustard is the chief source of commercial mustard. The seeds themselves are used in pickling, and are ground to secure the flour which is the base of the table condiment.

MUSTARD FAMILY, or CRUCIFERAE, *kroo sif' ur e.* The members of the mustard family number about 1,800 species. The leaves and stems of all forms have a sharp, stimulating flavor, and the four-petaled flowers somewhat resemble a Maltese cross, whence the name *Cruciferae.* Several well-known members of the family, including the horseradish, radish, turnip, cabbage, and cress, are used for food. The seeds of some other plants are made into oil and powder for use in medicine and cooking.

MUTA'TION. In plants and animals, mutation is a kind of variation which appears suddenly and produces a new type with characteristics which may be transmitted. A mutation may be a small or a large change, but it is something new that appears abruptly and breeds true. It is what gardeners call a *sport.* A single-flowered chrysanthemum may suddenly produce a seedling that has double flowers; this change would be a *progressive* mutation, as it is the acquirement of a new character. The acquirement of an extra finger or toe in man, many heritable cases of which are known, is another illustration.

Sometimes the mutation is the loss of a character, and an interesting illustration of this regressive type of mutation is found in albino men and animals, where the change is due to the loss of pigment, or color. Mutations are of great value to the plant breeder. See BREEDING; HEREDITY; NATURAL SELECTION.

MUT'TON. When a sheep reaches the age of three years, its flesh is no longer referred to as lamb, but as mutton. This meat provides slightly less nutriment than beef. After slaughtering, mutton is thoroughly chilled and cured for about three weeks before marketing. The carcass is generally sold whole to retail markets. The finest grades of mutton are pinkish-red in color. New Zealand, Australia, and Argentina have supplied European demands since artificial refrigeration has been made available on ships. See MEAT PACKING; SHEEP.

MYCENAE, *my ce' ne.* Located in the Greek Peloponnesus overlooking the Argive Plain, about six miles northeast of Argos, the ancient and powerful city of Mycenae existed perhaps as early as 3000 B. C. The city developed more or less independently until about 1600 B. C., when Cretan fashions and art became current. In 470 B. C., Mycenae was captured and destroyed by the Argives. Excavations on the site of the ancient city have unearthed gems, pottery, and other articles which prove the existence of a highly developed pre-Hellenic civilization.

MYRIAPODA, *mir i ap' o dah.* The small animals belonging to the group known as *Myriapoda* have somewhat the appearance of many-legged worms. They have slender bodies varying in length, some being microscopic in size and some tropical species being a foot long. The centipedes and the millipedes belong to this class. They live in dark, moist places, under logs and in damp cellars.

The myriapods have clearly defined heads with one pair of antennae, or feelers, and their bodies are divided into many segments, or jointed sections. The centipedes have a pair of legs on every section; the millipedes have two pairs of legs on every section, with the exception of a few segments just after the head. Millipedes are harmless, but some of the centipedes are poisonous. See CENTIPEDE.

According to another classification, centipedes are placed in the class *Chilopoda* and millipedes in *Diplopoda,* and the term *Myriapoda* is not used.

MYRRH, *mur.* Consisting of oily, yellow tear-shaped drops which harden and grow dark, myrrh is a gum resin which comes from a small balsam tree native to Arabia and Eastern Africa. It is used in medicine as a tonic, stimulant, and mouth wash, and as incense and in perfumery.

MYRTLE, *mur't'l.* Marked by small, shiny leaves and rose or white blossoms which are followed by black berries, the myrtle family comprises a large group of aromatic and evergreen trees and shrubs which produce several spices and herbal medicines. The *common* myrtle, native to the areas around the Mediterranean Sea and the temperate parts of Asia, is the source of a medicine used in Greece and India. It is also the basis for a native Italian wine, and in Southern Europe the bark is used in tanning.

Cloves, allspice, and Brazil nuts are products of trees belonging to the myrtle family. The myrtle bough was once used in religious ceremonies and to decorate the victors in various contests. It was also the symbol of civic authority in ancient Athens. A running plant known in the United States as myrtle is more properly called *periwinkle* and is a member of a different family.

MYS'TERIES. Like secret societies of modern times, mysteries in the days of ancient Greece and Rome were closed to all but those participating in them. They took the form of religious assemblies and festivals, and were formed for the purpose of perpetuating the traditions of the various gods and keeping alive the teaching and practice of certain rites. Among the Greek mysteries were the *Eleusian,* the *Samothracian,* the *Dionysia,* and the *Orphic.* The *Dionysia,* celebrated in honor of Bacchus or Dionysus, became an immoral festival that had to be banned.

MYSTERY. The mystery plays of the Middle Ages were religious dramas performed on solemn occasions in churches. They usually depicted scenes from the Scriptures, thus differing somewhat from the miracle plays, which dealt with the lives of the saints. The mysteries were performed from the twelfth to the sixteenth centuries by guilds, being usually presented on Corpus Christi Day.

The favorite mystery play was the *Passion of Christ.* Some of the others included the *Slaughter of the Innocents, The Creation of the World,* and the *Fall of Man.* The original mystery play has come down to us in the form of the passion play presented every ten years in Oberammergau, Bavaria.

For additional information, consult the following articles:

Drama
Miracle Play
Morality Plays
Passion Play

HE BEHEADED MEDUSA
Rescuer of Andromeda, his future wife, from a sea monster, Perseus was a hero to the Greeks.

MYTHOLOGY, *mith ol′ o ji.* It is easy to think of man, in his very earliest years upon the earth, as accepting everything about him without question, just as a baby in a home smiles when warm and well fed and cries when cold or hungry, but never questions why he is one or the other. But gradually, as man advanced intellectually, the word *why* came into his mind and perhaps into his vocabulary. *Why* was it light all day and dark at night? *Why* did the rain fall and put out the fire which he had just laboriously built? *Why* did those about him die—old men and babies, and sometimes strong young men? *Why* did a long, cold period follow, regularly, the beautiful, warm summer?

No one man could ever hope to answer all the questions that came into his mind day after day and year after year. But little by little, among every primitive people, there grew up answers to most of these troublesome questions; and these answers to the incessant *why* of inquiring minds, constitute the larger part of what, today, is called mythology.

Esthetic Myths. There are myths—and many of them—which explain nothing, and students of mythology account for these in one of three ways. Perhaps originally, they say, all these myths *were* nature myths, and did explain natural phenomena. It would be probable then that in the years that elapsed between their invention, and the time when scholars began to take an interest in them, some of their significance should be lost.

On the other hand, some students believe these esthetic myths were simply made up as stories, and never did attempt to explain anything. The love for stories seems to be born in everyone, and it is easy to imagine that primitive peoples, having had a taste for story-telling in the nature myths, demanded more, and that the myths which describe the adventures of the gods and heroes were made up in response to such demands.

The third possible explanation is that all these adventure myths were originally biographies of great heroes who had died. Gradually, as the tales were passed on from one story-teller to another, more wonderful details were added, until in time the story

GODS OF OLD IN EGYPT

The sacred bull, Apis (1). Horus, son of Osiris (2).

passed quite out of the realm of natural things into that of the supernatural, and the admired hero became a god, or at least a semigod.

Mythology Touched All Life. It is difficult for the modern reader to realize to what an extent this mythology entered into the lives of primitive people. Science was unknown, the logical procession of cause and effect was unsuspected; and a special deity had to be invented to account for each happening in the world of nature. The ancient Greek, for example, saw in the sun the gorgeous chariot driven across the heavens by ray-crowned Apollo. The moon was the lovely chariot of his twin sister, Diana. Did a stream murmur over its shallow, stony bed? The stream god was distressed and complaining, because the water was not deep enough to cover him. Was the sea lashed and driven under a furious storm? The sea god was raging because his sacrifices and libations were neglected.

If a tree drooped, the dryad or goddess who lived in it was dying for love of some hardhearted god or mortal; if the grain was parched under a scorching summer sun, the kindly sun god had allowed an amateur to drive his chariot. A child could not be born, a tree could not be planted, a grave could not be dug, according to the ancients, without the blessing and aid of some deity.

Mythology and Religion. Because all mythology is woven about deities, it might seem the simplest thing to call it the *religion of primitive peoples.* So, indeed, it was, but it lacked much that in Christian

RULING MEN'S LIVES
Ancient Greeks saw in their good or evil fortunes the handiwork of three sisters, the Fates, daughters of Zeus and Themis. One spun the thread of life, one measured it, another cut it (left). Pandora (above) was another example of the gods' designs.

lands is considered absolutely essential in a religion. A religion, for instance, which did not seek to help people, or at least urge them to live better lives, to be kinder, more unselfish, more helpful, would seem a strange sort of religion.

But the ancient mythologists concerned themselves not in the least with such things. True, a man might not commit murder without bringing down upon himself the wrath of the gods—unless he murdered someone whom the gods did not love. But he might cheat, calling on some clever, tricky god to aid him; he might lie, abuse his wife and children, or steal, and the gods would still look with favor upon him. Let him, however, forget the offerings and the formal worship due some deity, and great was the wrath and vengeance of that outraged power which he had seemingly scorned.

Mythology and Science. It will be clear from a consideration of what is said above about the origin and growth of mythology, that it was the only substitute for science possessed by the primitive peoples, as well as the only religion. But it will be plain, also, that of science in the modern sense there was no trace in all the world of myths. Of course, as long as everything puzzling could be explained as the work of some auspicious or angry deity, there was little reason for delving into the natural law of cause and effect. And without the understanding of cause and effect, there is no science such as we know it in the modern world.

To account for the coming of winter, the Greeks and Romans fashioned the exquisite story of Proserpina, daughter of Ceres, who was stolen by the god of the underworld. Her mother sought for her sorrowing, and finally discovered where she was. The dark god refused to give her up, but at last, by the intervention of other deities, a compromise was arranged. Proserpina was to stay six months each year in her underground home; the other six months she was to stay with her mother on earth. For six months, then, while she had her daughter with her, Ceres blessed the land with fruitfulness and beauty; but when her daughter left her she mourned, and refused to allow any green thing to show its head.

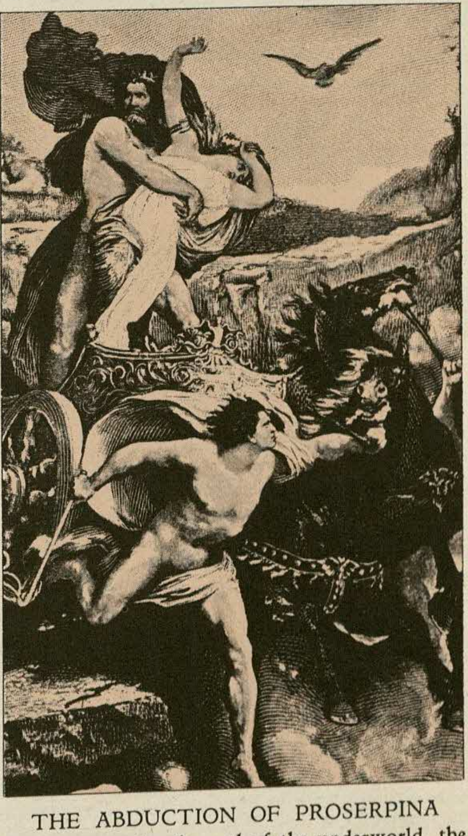
The Norsemen invented the sad story of Balder's death at the hands of the blind god Hodur. Hodur represented the cruel northern winter, which so jealously blots out every trace of summer's loveliness.

The Gifts of Mythology. There are several reasons why the study of mythology is important. We are able to learn much about how ancient people lived and what they thought. In addition, the myths have a fascinating interest of their own, just as fairy tales have. Then, too, many of the greatest works in literature deal with incidents and descriptions of the gods and goddesses, and a knowledge of mythology helps to make such literature more enjoyable.

Mythology, as a study, is also important because of the many contributions it has made to the world. For instance, many words and figures of speech have been given to language by the classic myths. One word, *tantalize,* comes from *Tantalus,* the name of a king of Phrygia who was banished to Hades, where he had to stand in a pool with his chin on a level with the water. Every time he attempted to take a drink, the water disappeared, while the branches of fruit trees, laden with luscious olives, plums, and other delicacies, hung closely over his head. Yet, near as they were, he was unable to obtain any.

The word *chimerical* is another example. The Chimera was a fantastic animal with the body of a goat, the head of a lion, and the tail of a dragon. Any fantastic scheme having many aspects is thus called *chimerical.* The familiar word *cereal* also has its origin in mythology, for Ceres, as stated above, was the goddess of agriculture.

Figures of speech derived from mythology also are interesting. One, referring to the two monsters Scylla and Charybdis, who destroyed unlucky sailors, has given rise to the expression "between Scylla and Charybdis" to describe a person in a dilemma. Another, "cleansing the Augean stables," to describe the difficulty of getting rid of corruption, refers to one of the



THE ABDUCTION OF PROSERPINA
Carried away by the god of the underworld, the beautiful daughter of Ceres took summer with her.

PATRON OF THE WORLD'S CRAFTSMEN

Cast down from Olympus, Vulcan was lame and was not like the other gods, although the son of Jupiter and Juno. He was the classic god of fire and presided over the forge where metals must be heated to be worked. Vulcan was so skillful at his work that he had the marvelous power of bringing the things he made, such as golden dogs, to life.

Herculean labors. Still others are: "hit by Cupid's dart," for falling in love; "Argus-eyed," for alertness; "to be overtaken by a Nemesis," referring to the vengeance of another.

Norse and Greek Mythologies. Striking similarities and differences between the Norse and Greek legends are found in the study of mythology. Both peoples believed that the earth was formed out of chaos, although their conceptions of chaos differed. And they both believed that the gods were created from this chaos. The Norse myths, however, emphasized the grand and the tragic, with perpetual struggles between the good and bad forces of nature. This idea was logical, considering the climate of the region, and it explains the difference between these stories and the idyllic tales of Greece and Rome, where the climate was comparatively mild.

Another important difference is that in Norse mythology the gods were always considered mortal, while the Greeks and Romans considered their deities immortal, even though they were described as persons having much the same thoughts and doing much the same things as ordinary beings.

For additional information, consult the following articles:

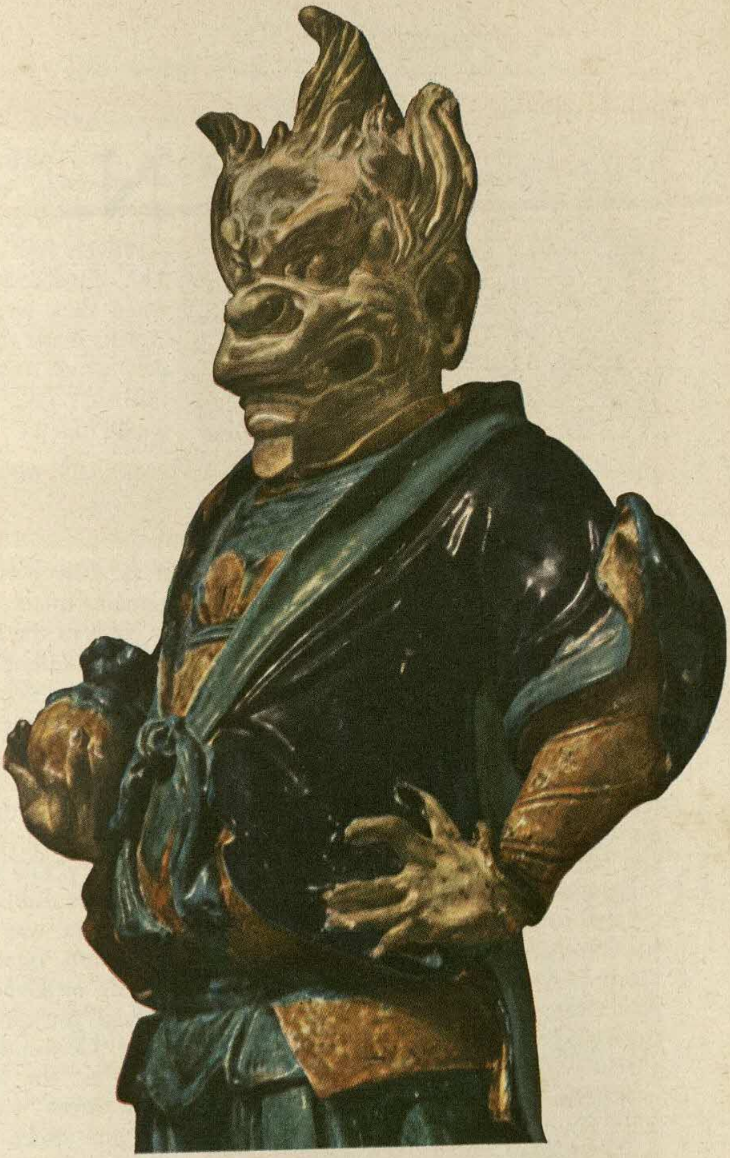
GREEK AND ROMAN MYTHOLOGY

Achilles
Adonis
Aeneid
Aeolus
Amazons
Apollo
Argonauts
Atlas
Augeas
Augurs
Bacchus
Baucis and Philemon
Cadmus
Calliope
Centaur
Cerberus
Ceres
Circe
Cupid
Cyclops
Daedalus
Deucalion

TERRIFYING PROTECTOR

This colorful Thunder God with a monkey's face is typical of the frightening figures used in front of Chinese temples to guard them from evil. It was probably a temple gift from the founder of the Ming Dynasty in the latter part of the 1300's. Oriental mythology goes far back to prehistoric times and has been a rich source of material for artists through the centuries. A mixture of religions — Buddhism, Confucianism, and Taoism— has given the Chinese a bewildering number of gods to follow. India has even more. A feeling of fear and a strong desire to drive away evil spirits are found in many of the Oriental religions. Many of the old customs and traditions are still followed.

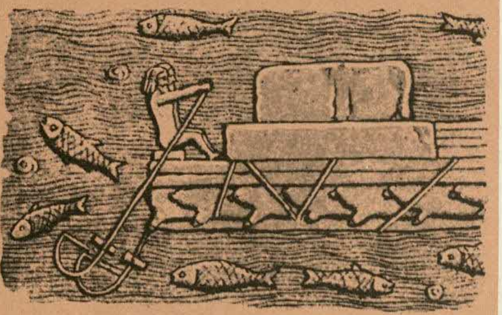
Walter Curtis,
Copyright 1957 by Time, Inc.



Diana
Dido
Europa
Fauns
Furies
Gorgons
Graces
Hades
Harpies
Hector
Helen
Hercules
Hero
Hesperides
Janus
Jason
Juno
Jupiter
Mars
Medusa
Menelaus
Mercury
Minerva
Muses
Naiads
Nectar
Neptune
Niobe
Nymphs
Oracles
Orion
Palladium
Pan
Pandora
Paris
Penelope
Perseus
Phaethon
Pluto
Priam
Prometheus
Psyche
Pygmalion
Rhea
Romulus
Saturn
Satyrs
Sirens
Styx
Theseus
Titans
Troy
Ulysses
Venus
Vulcan

SCANDINAVIAN AND EGYPTIAN MYTHOLOGY

Ammon
Balder
Frey
Freya
Frigga
Loki
Niflheim
Odin
Osiris
Sigurd
Thor
Valhalla
Valkyries
Yggdrasil



N. The fourteenth letter of our alphabet, *N* is one of the letters which has come down to us with comparatively few changes since ancient times. The Phoenicians wrote it 𐤍 . At first, when they wrote from right to left, the Greeks made the letter like this, 𐌍 . Later they wrote from left to right and made it this way, Ν. The Romans wrote it *N*, as we do today.

NAGOYA, *nah go'yah,* JAPAN. Lying in the center of a fertile plain on the island of Honshu is Nagoya, famous for its historic traditions as well as its present-day commercial importance. Capital of the Japanese prefecture of Aichi, it is a modern and prosperous seaport, with a picturesque setting and a mild climate. There are several temples and monuments in Nagoya, and also a famous castle, which was once the seat of the Japanese feudal lords.

Bombed in World War II, Nagoya recovered to become a center of heavy industry, producing planes, automobiles, and machine tools, as well as such traditional products as textiles and pottery. It serves as the market for the surrounding agricultural region. The population is over a million.

NAIADS, *na'yadz.* Sprightly nymphs who inhabited the fountains and brooks were called naiads, according to the legends of ancient Greece. In fairy stories of other European countries, they were known as nixies.

NAILS. Covering the upper surface of the end phalanx of each finger and toe, the nails are a modification of the epidermis (skin).

The human nail is identical in structure with the hoofs and claws of the lower animals and the talons and bills of birds. The root of the nail rests upon the matrix, a fold of the true skin richly supplied with blood vessels upon which growth of the nail depends. When a nail is torn off, it is soon replaced, provided the matrix remains intact.

Nails of the fingers grow out at the rate of about one-thirtieth of an inch per week. Clean, well-kept nails are a good indication of proper pride in one's appearance.

NAMES, PERSONAL. Almost as ancient as man himself is the custom of naming persons. But the personal names of people were not always chosen as they are today, and they did not have the same significance. In Biblical times, for instance, only one name was given to a person, such as Abraham, Isaac, Jacob, Moses, Aaron, Rebekah, or Deborah. Each of these had a special meaning, but no surnames were used. Occasionally, however, such appellations as "the Wicked" or "the Good" or "the Great" were used after the name, a custom which lasted until almost recent years.

At first, the Romans, like the Hebrews, Phoenicians, Egyptians, Assyrians, Persians, Babylonians, and Greeks, used no surnames, but later they developed a system of three names: the first, called the *praenomen,* was the personal name; the second, the *nomen,* was the name of the gens or clan; and the third, the *cognomen,* was the family name. Still another was added later, as an *agnomen,* to describe the particular conquest of a soldier.

Last names came to be widely used in the time of the Crusades, when so many men of the same name were grouped together. It was in the Middle Ages, also, that the custom originated of using the name of a trade, an animal, a location, or a personal characteristic. Men also came to be called "son of" for their last names, or used names referring to the province or place in which they lived.

Thus, we have men named Fox, Wolf, Lyons, for animals; Lake, Rivers, Hill, for places; Smith, Miller, Carpenter, for trades; Johnson, Williamson, Jackson, for names of sons; and Brown, Long, Short, for descriptive characteristics. *Mc, Mac, O', Fitz, sohn, sen, vitch, ap, pen, de* or *d'*, and *ski,* placed before or after a name in the various languages, have the same meaning as *son* in English.

Except in Spain, it is customary for a woman to adopt the surname of her husband. In that country she has her choice, and the children may adopt either the maternal or paternal surname.

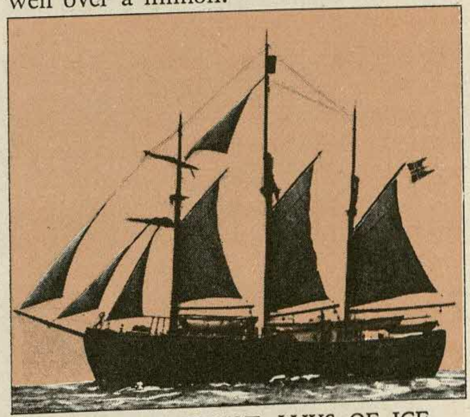
If a person wishes to change his name, the safest method is to ask court approval, that the change may be legally recorded. In some states, a name may be changed only by a special act of legislature.

NAMES, PLACE. Just as personal names originated in a variety of ways, so the names of cities, towns, villages, valleys, rivers, mountains, countries, states, and other places have been coined from a number of sources. In England and Wales, the name *pen,* meaning *hill,* accounts for such names as Penzance and Penrhys; while in Scotland the name *ben,* also meaning *hill,* is responsible for many names of mountains, such as Ben Nevis.

In the United States there are many cities and towns whose names end in *-ton, -ville, -berg,* or *-burg*. Each of these means *town* or *city*. So, too, are there many places named for great figures in American history, such as Jefferson, Washington, Lincoln, and Jackson. Still others are named after their founders, or monarchs, like Georgia, for George; Virginia, in honor of Elizabeth, the Virgin Queen; Baltimore, for Lord Baltimore; and Saint Louis, in honor of Louis XV.

NANKING', CHINA. Situated in the east-central part of China on the Yangtze River is the historic city of Nanking, which served as the capital of Nationalist China until occupied by Communist forces. Nanking has had a long and troubled history. It served as the capital of the Chinese Empire from 1368 to 1403. In the following centuries it was captured many times, but in 1853, during the Taiping rebellion, it was nearly destroyed by the rebels, many of its beautiful buildings and monuments being reduced to ruins. It served for a year as the capital of the rebel government.

For a short time after the revolution of 1911, under Sun Yat-sen, and again in 1928 under the Nationalists, it was the capital of China. Japanese invaders seized and looted the city in 1937, but the Nationalists re-established their capital there in 1946. In 1949, Communist forces took control. The population of Nanking is well over a million.



BUILT TO RESIST JAWS OF ICE

The stout schooner *Fram* carried explorer Nansen safely through crushing Arctic floes.

NANSEN, *nahn'sen,* FRIDTJOF (1861-1930). Before the North Pole was discovered, Fridtjof Nansen, a Norwegian explorer, held the record of penetrating farther north than any other man. This record he achieved after three years of isolation from civilization and at risk of his life.

Nansen began his adventurous career before he was twenty-one. He voyaged from Spitsbergen to Greenland to study animal life after his graduation from the University of Christiania. When he was twenty-seven he crossed the formidable ice cap of Greenland. His most famed exploit was undertaken in 1893 when, with twelve companions, he voyaged in a specially constructed vessel, the *Fram,* to the Arctic Ocean, became wedged in an ice pack, and drifted in it for eighteen months. Finally, in March, 1895, Nansen, with one companion, left the ship and started by sled for the North Pole. The hardships forced them to turn back when they reached latitude 86°4′; this was 261 miles from the Pole, and the point farthest north ever reached by man up to that time.

In 1896 Nansen was picked up by the British exploring party under Captain Frederick George Jackson, having spent three years in frigid wastes. He had discovered that there is no Arctic continent; he found new islands and coasts; and covered approximately 50,000 square miles of unknown waters. His experiences were included in his book, *Farthest North.*

After another expedition into the Arctic, in 1900, Nansen became director of the International Central Laboratory in Christiania. After World War I, he brought about the repatriation of prisoners of war stranded in Siberia. Famine relief to Russia was also organized under his direction. Later he was appointed by the League of Nations as High Commissioner for Refugees, to aid Armenians, Russians, and Greeks. He was awarded the Nobel Peace Prize in 1922. See NORTH POLAR EXPLORATION.

NANTES, *nants,* EDICT OF. By this proclamation of Henry IV of France, in 1598, the Huguenots were declared equal with Catholics in political rights and were given greater freedom of worship. For the time being, religious wars were ended and Protestant churches were erected in all parts of the country except in Paris. How-

MASSIVE MUSEUM BEARS MARKS OF WAR

The steps of the National Museum in Naples still show bullet holes made by machine-gun fire during World War II. This building has been used as a museum since 1790. It contains relics from Pompeii and is a treasure house of Greek and Roman antiquities, including bronzes, marbles, and jewelry. The museum also owns a valuable picture collection.

ENIT Rome

ever, the Huguenots were required to recognize Catholic festivals and to contribute tithes.

Louis XIV revoked the edict in 1685, and as many as 500,000 Huguenots are believed to have left France as a result. See HUGUENOTS.

NAPHTHA, *naf'tha.* Originally, any inflammable liquid was regarded as naphtha, but now the term refers more particularly to the lighter products of petroleum distillation, from which benzine and gasoline are made. Petroleum naphthas are used for cleaning purposes, as solvents for oils and fats, as fuel, in paints and varnishes, and in photography. Naphtha distilled from wood is wood alcohol. Crude naphtha is distilled from coal tar. See DISTILLATION; PETROLEUM; WOOD ALCOHOL.

NAPLES, *na' p'lz,* ITALY. One of the most beautiful cities in the world is Naples, in southwestern Italy. Lying on the wide, picturesque Bay of Naples, the city presents a charming picture from the sea, for the spires of its ancient buildings stand out against the background of famous Mount Vesuvius. Its historic traditions and buildings and its delightful climate attract thousands of visitors each year.

In addition to being an important seaport, Naples is an industrial center. Its leading manufactured articles include ships, machinery, macaroni, glass, cotton goods, silks, jewelry, china, perfumes, and soap. Naples is noted for its exports of fruit, nuts, wine, and brandy. With a population of over 1,000,000, Naples ranks third among the cities of Italy.

There is a blending of old and new in Naples. The more modern sections have wide boulevards and large public buildings. Among the most famous of the ancient structures are a great Gothic cathedral built in the thirteenth century; the University of Naples, which dates from the same period; several very ancient castles; the San Carlo Opera House; and the National Museum, which houses the art of antiquity, particularly that from Pompeii and Herculaneum.

Naples was founded by the Greeks many centuries before the birth of Christ, but in 328 B. C. the Romans gained control. The Ostrogoths captured the city from the Romans, and in turn lost it in the sixth century to the Byzantines. Naples was the capital of the Kingdom of the Two Sicilies. In late 1943, it was captured by the Allies during World War II. Before fleeing the city, the Germans systematically wrecked it; they carried away many of the art treasures, burned the Library of the Royal Society, razed the University, and destroyed the waterworks. See SICILIES, KINGDOM OF THE TWO.

SINGLE-HANDED, HE SEIZED EUROPE
Adventurer, emperor, exile . . . Napoleon Bonaparte.

NAPO'LEON I (1769-1821). Few men since Julius Caesar have influenced the history of the world so much as Napoleon Bonaparte. Historians and biographers have never ceased in their attempts to estimate his influence on the world and to gauge his character. For the years of the

LONELY SCHOOL DAYS FOR THE FUTURE EMPEROR
The influence of a French governor of Corsica secured the young Bonaparte admission to the military school of Brienne. Ridiculed by his classmates, he was unhappy.

Napoleonic era were the most momentous in the history of the European continent.

The tactics and strategy of this super-soldier enabled France to dominate the affairs of Europe during the first fifteen years of the nineteenth century. Napoleon's men followed him blindly. Yet this conqueror of nations died in lonely exile on the little island of Saint Helena, off the coast of West Africa.

Early Military Career. Napoleon Bonaparte was born at Ajaccio, Corsica. He attended the military schools at Brienne and Paris, and became a captain of artillery in 1792. France was then in the throes of the French Revolution, and Napoleon elected to cast in his lot with the Revolutionists. In 1793, while taking part in the siege of

THE RETREAT FROM MOSCOW
Napoleon's prestige and power began to decline with his futile and disastrous invasion of Russia in 1812. Of the great army he led, only about four per cent returned safely.

EUROPE'S MAP MAKER DEFEATED ON THE DANUBE

Because he could not bridge the river well enough to use his superior numbers, Napoleon lost the fiercely fought Battle of Aspern to the Austrians under Archduke Charles.

Toulon, which was held by the enemies of the Revolution, he first showed his ability as a military leader, and upon the capture of the city, was promoted to the rank of brigadier general. In 1795 Napoleon was called to Paris to restore order. Successful in this undertaking, he next seized all of Northern Italy for the French. In the war against Austria, he gained the Netherlands and Lombardy.

By 1797, when Napoleon returned to Paris, he had become a popular hero, and the Directors, who feared him, sent him to Egypt to strike a blow at England. He captured Alexandria in July of the following year and took Cairo immediately afterward, but Nelson, the English commander, destroyed the French fleet in the Battle of the Nile. Napoleon continued the campaign in 1799, but when he heard that a Royalist uprising threatened in Paris, he returned immediately, joined in an alliance with Lucien (his brother), Talleyrand, and others, overthrew the Directory, and became the first consul of France, the ruler of the country. Napoleon quickly restored order, instituted reforms, and drafted a code of laws, the famed *Code Napoleon*.

Emperor of the French. Napoleon attacked Austria again in 1800, defeating the imperial army at Marengo and Hohenlinden. Following the Treaty of Lunéville, he made other treaties with Spain, Naples, the Pope, Bavaria, Portugal, Russia, Turkey, and England; and in 1802 he was

Photo by Brown Brothers

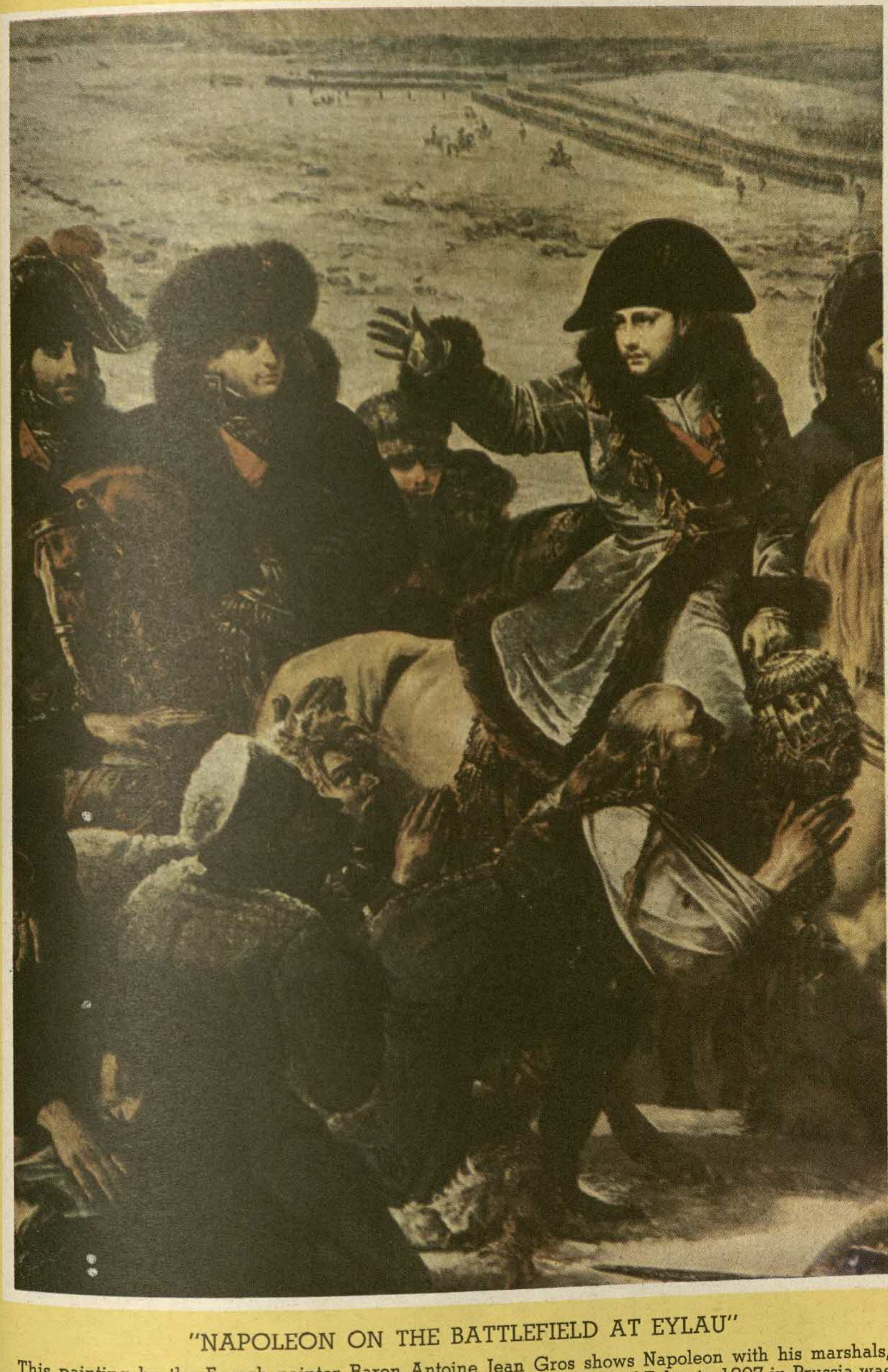
THE DUKE WHO DIRECTED NAPOLEON'S DOWNFALL

Britain's great general, the Duke of Wellington, commanded the armies that won the Battle of Waterloo, ending Napoleon's attempt to regain power after his return from Elba.

given the post of consul for life. Two years later, Napoleon was crowned emperor of France, following a popular election. In 1805 he took the field again against Britain, Russia, Austria, and Sweden, and although he was eminently successful on land, his fleet was defeated by Nelson at Trafalgar. But he captured Vienna, and won his greatest victory in December of that year by defeating the Austrians and Russians at Austerlitz. As a result, France obtained all of Austria's Italian and Adriatic possessions.

Intent on consolidating his gains in Europe, Napoleon placed his brother, Joseph Bonaparte, on the throne of Naples and made another brother, Louis, the king of Holland. He created dukedoms in Germany and Italy for some of his generals, but this policy led to war with Prussia, culminating in additional victories at Jena and Auerstadt. Russia came to the aid of Prussia after Napoleon had entered Berlin and had issued the Berlin Decree announcing the Continental System, which was a proposed commercial blockade of England. He was checked at Pultusk and Eylau, but in 1807 he compelled the Russians to sue for peace when he defeated them at Friedland.

The Peace of Tilsit, which followed, forced Russia to relinquish territory from which the Grand Duchy of Warsaw was created, and stipulated that Russia would



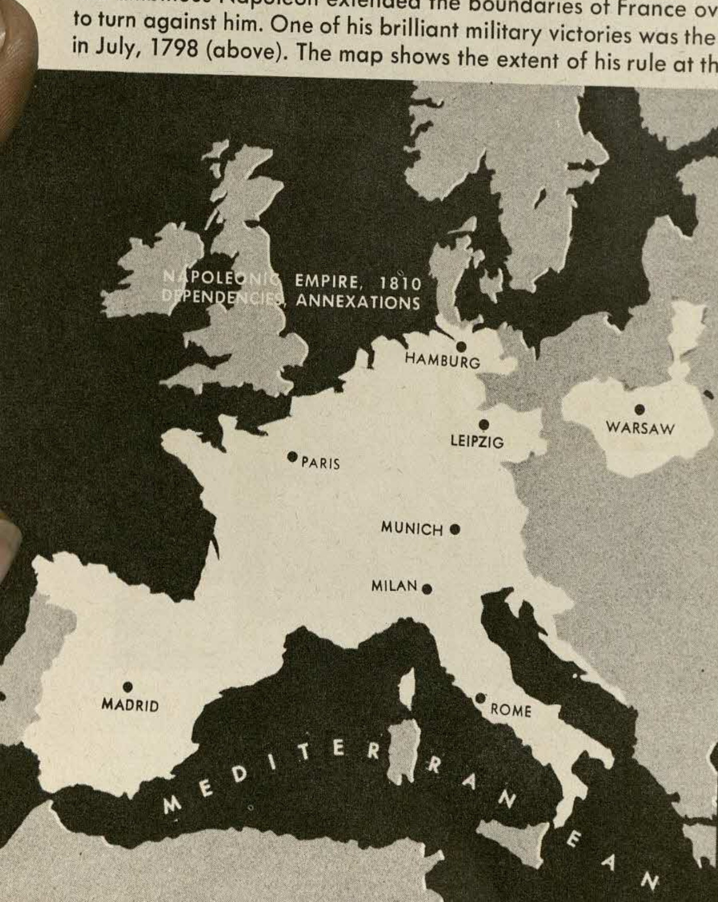
"NAPOLEON ON THE BATTLEFIELD AT EYLAU"

This painting by the French painter Baron Antoine Jean Gros shows Napoleon with his marshals, dying French soldiers, and "freed" Poles and Lithuanians. The battle of Eylau in 1807 in Prussia was a frightful carnage of Russians, Prussians, and the French. Gros was one of the first to paint history in the making. He followed his hero Napoleon on the latter's campaigns, and painted very little of note after Napoleon was defeated.

NAPOLEON — GENERAL AND EMPEROR

U. S. National Museum

The ambitious Napoleon extended the boundaries of France over much of Europe before the tide began to turn against him. One of his brilliant military victories was the Battle of the Pyramids, fought near Cairo in July, 1798 (above). The map shows the extent of his rule at the height of his power in 1810.



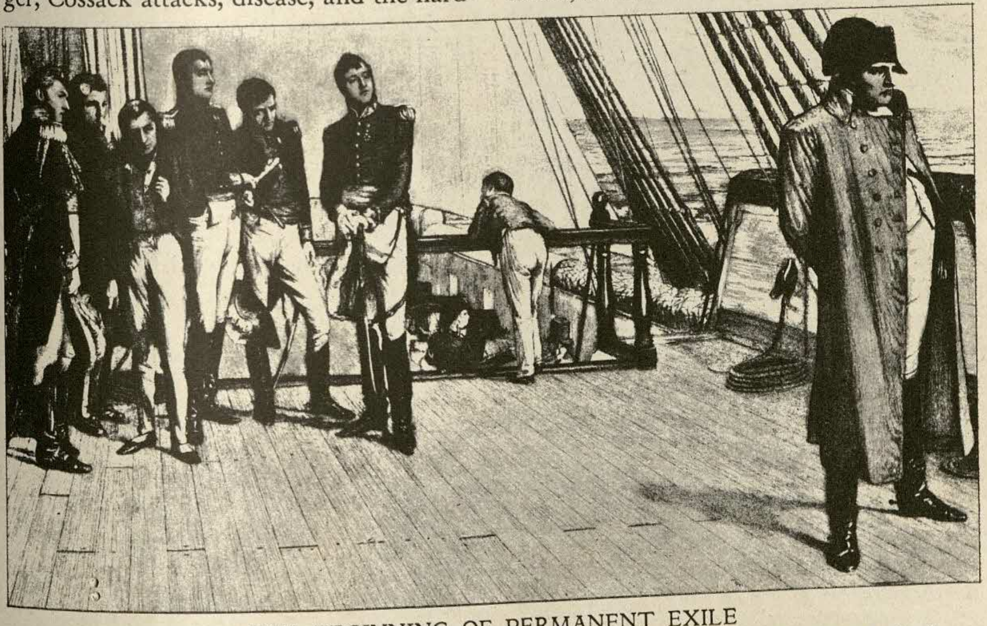
engage in the commercial war against Great Britain. Again, Napoleon extended his sway by placing a brother, Jerome, on the throne of Westphalia. Wars followed with England and Austria in Spain and Bavaria; but Napoleon was victorious again in 1809, and a brief period of peace came to Europe.

Napoleon had married Josephine de Beauharnais in 1796; but upon his return to Paris, in 1809, he divorced her because she bore him no children. Anxious to found an imperial line and to secure Austria as an ally, he married Maria Louisa, daughter of Francis II of Austria, in 1810. Their son was born the following year.

In 1810 and 1811, Napoleon was at the height of his power. His decline began in 1812, when he declared war against Russia because that country failed to live up to its boycott of England. With an army of 600,000 he marched into Russia and reached Moscow, only to find the city on fire. Cut off from supplies, he was forced to retreat; and in this terrible, disastrous maneuver, his great army, tortured by hunger, Cossack attacks, disease, and the hardships of a Russian winter, was reduced to 25,000 men.

Defeat and Exile. The other powers now saw that the time was ripe for a crushing blow. An alliance was formed between England, Prussia, Austria, and Russia, and in 1813 the campaign to crush the conqueror began. France was alone now, and although Napoleon put up a stubborn defense, his outnumbered army was crushed at Leipzig in October in the "Battle of the Nations." Unwilling to admit defeat, he rebuilt his shattered forces, and in the winter of 1814 stubbornly resisted the advance of his enemies. Finally, the Allies entered Paris in March; Napoleon was forced to abdicate, and he retired to the island of Elba.

There, he plotted to return to power, and on March 1, 1815, landed in France. Marshal Ney joined him, the faithful veterans of his past campaigns gave him welcome, and in triumph he marched to Paris, overthrowing Louis XVIII, who had been placed on the throne. This brief episode of power, the sunset of Napoleon's career, is known in history as "The Hun-



THE BEGINNING OF PERMANENT EXILE
Fleeing an embittered France after Waterloo, Napoleon surrendered to Captain Maitland of *H.M.S. Bellerophon*, who showed him deference but held him for Saint Helena.

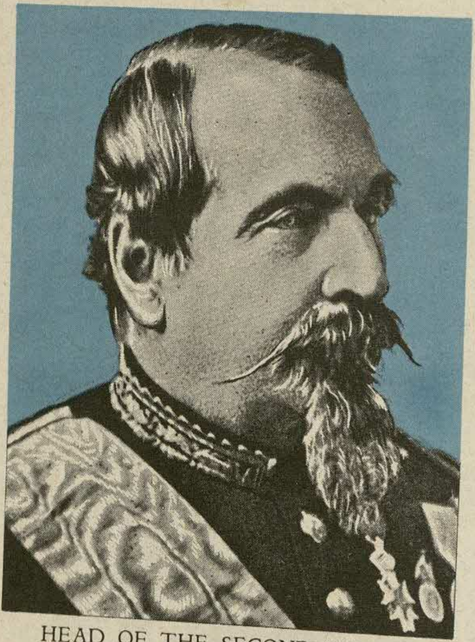
dred Days." He engaged the allied troops in Belgium, won some victories, but finally was completely and definitely crushed in the world-shaking Battle of Waterloo, on June 18, 1815.

Again Napoleon abdicated, was captured, and was banished forever from Europe to Saint Helena. He died six years later of cancer. In 1840 his remains were brought back to Paris to rest in the Hôtel des Invalides.

For additional information, consult the following articles:

Austerlitz
Blücher, Gebhard von
Bonaparte
Continental System
Corsica
Directory
France
French Revolution
Josephine, Marie Rose
Louisiana Purchase
Maria Louisa
Nelson, Horatio
Saint Helena
Trafalgar
Waterloo, Battle of
Wellington, Duke of

NAPOLEON II, son of Napoleon I. See Reichstadt, Napoleon François Joseph Bonaparte, Duke of.



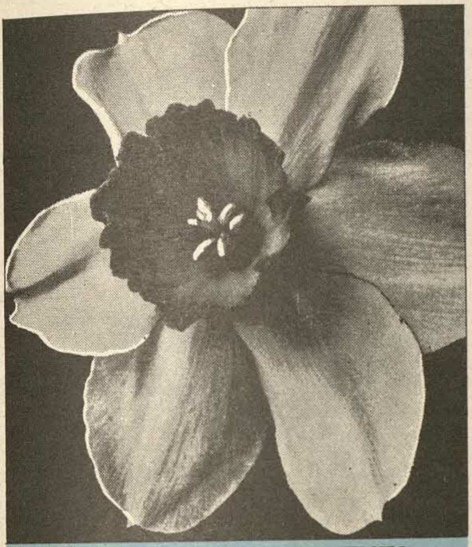
HEAD OF THE SECOND EMPIRE
Napoleon III, ambitious nephew of a Caesar.

NAPOLEON III (Charles Louis Napoleon Bonaparte) (1808-1873). Ambitious as his uncle, Napoleon I, but far inferior to him in ability, Napoleon III was the last head of the French Government before the Third Republic. Son of Louis Napoleon, king of Holland, and of Hortense Beauharnais, stepdaughter of Napoleon I, Charles Louis Napoleon early yearned to re-establish the empire in France. He made several unsuccessful attempts, but in the Revolution of 1848, which drove Louis Philippe into exile, he succeeded in winning a seat in the National Assembly, and was later elected to the Presidency of the Second Republic.

In 1852 he was proclaimed emperor of the Second Empire, as Napoleon III. The next year he married Eugénie de Montijo, who was to outlive him by forty-seven years. In 1854 Napoleon entered the Crimean War as an ally of England and Turkey against Russia, and in 1859 he sided with Victor Emmanuel of Italy in the war against Austria.

Napoleon's reign was a troubled one. His ill-advised attempt to establish a Latin empire in Mexico ended in 1867 with the capture and execution of the puppet emperor, Maximilian (see Maximilian). In 1866, after Prussia had defeated Austria in the Seven Weeks' War, Napoleon saw the danger of Prussia's growing power, and ill-feeling developed between the two countries. Finally, in 1870, Napoleon foolishly precipitated the Franco-German War, with France unprepared and Prussia fully equipped. Napoleon was captured at Sedan. At the close of the war he was deposed and went to England, where he spent the rest of his life. His only son, who had joined the British forces in South Africa, was killed by Zulus. See France; Franco-German War.

NARCIS'SUS. Because of their crisp, beautiful yellow and white blossoms and delightful fragrance, species of narcissus are widely grown. They are a genus of bulbous plants chiefly native to Europe. The white narcissus grows without soil, requiring only water and pebbles to support the bulb. The daffodil and jonquil, which are related to the narcissus, are familiar spring flowers.



PRAISED BY THE ANCIENTS
The narcissus was extolled by Grecian poets.

NARRAGAN'SET. Today there are no pure Narragansets, Indians who once inhabited Rhode Island. Friends of Roger Williams, they joined in King Philip's War, lost 1,000 warriors in the famed Swamp Fight, and, when their leader Canonicus died, were subdued and dispersed.

NARVAEZ, *nahr vah' eth,* PÁNFILO DE (1470?-1528). Little is known of this early Spanish adventurer who sought to explore America. After spending some years in Cuba, he returned to Spain. Having received a grant of Florida land from Charles V, he again set out for the New World, arriving in 1528. While his men were exploring the interior of Florida, many of them were killed by Indians. Returning to the coast, the survivors built crude vessels and set out for Mexico. But the boats were destroyed in a storm, and Narvaez and all but four of his men perished.

NARWHAL, *nahr' wahl.* Because of its pointed seven-foot tusk projecting from between its eyes, the narwhal is easily distinguished from other mammals of the Arctic seas. The animal is about twenty feet in length, and it has a long, tapering body which ends in a fish-like tail. On either side of the body, near the head, there is a limb which resembles a fin. As it has no teeth, the animal feeds on mollusks and small fishes. Commercially, the narwhal is valuable; its tusk is used for ivory, its blubber supplies oil, and the skin is used in making various articles. It is also known as the *sea unicorn, unicorn fish,* and *unicorn whale.*

NASH'VILLE, TENN., is the capital and second largest city of the state. It lies along both banks of the Cumberland River in a rich mineral and agricultural district. Its population is about 167,000. Leading industries are printing and publishing, the manufacture of cellophane and rayon, tobacco products, prepared meat, boots and shoes, cotton goods, flour, hardwood products, and machinery.

Nashville has a number of beautiful buildings and monuments, which include the state capitol, the War Memorial Building, a statue of Andrew Jackson, and the tomb of James K. Polk. One of the city's most noted structures is a reproduction of the Parthenon at Athens.

An educational center, Nashville is the site of Vanderbilt University, George Peabody College for Teachers, Scarritt College for Christian Workers, Belmont College, David Lipscomb College, Fisk University, and Meharry Medical College. Nashville was founded in 1779 by James Robertson of East Tennessee.

NASSER, *nah' sur,* GAMEL ABDEL (1918-), leader of Arab nationalism, was born at Beni Mor, Egypt. He attended the Cairo Royal Military Academy and fought in the Egyptian-Israeli War of 1948-49. He dethroned King Farouk in 1952, became Premier of Egypt in 1954, and President in 1956. He obtained British withdrawal from the Suez Canal zone in 1956, and took over the Suez Canal Company. In 1958, he united Egypt and Syria in the United Arab Republic, and tried to get other Arab nations to join. He promoted land reform and education for the poorer people, and secured Russian loans for internal improvements.

NASTURTIUM, *nas tur' shum.* A native of South America, the nasturtium is one of our familiar garden flowers. Its bright yellow, orange, or red blossoms have five petals, three of which cluster a little apart from the other two. Its large, round, glossy leaves form a perfect background for the blossoms. Some nasturtiums are climbers and grow to a height of fifteen feet; others are trailers. The leaves and flowers are sometimes used in salads; the seed pods are pickled and used as a substitute for capers.

NATIONAL DEBT. Just as many individuals have debts, so do nations have debts—money which they have borrowed from individuals, corporations, or other governments in order to finance themselves. In general, the greatest single causes for national indebtedness are war and military preparedness.

As a rule, the smaller the national debt, the sounder a country is financially. However, rapidly growing, prosperous states are often justified in incurring a large debt in order to develop their resources. A country with secure credit may sometimes borrow money without a definite date of repayment and at low rates of interest. A weak country may have to offer very high rates of interest in order to attract investors. Usually, governments pay off debts gradually over long periods of time, by revenues collected or by new loans to mature at future dates. Sometimes, nations repudiate debts in part or wholly, or become bankrupt and unable to pay. There has been found no redress in such a situation. A country with sound credit does not increase the national debt beyond a reasonable limit.

World War II produced a new philosophy, the Lend-Lease idea, originating in the United States. The Allies loaned to each other not only money or credit, but raw materials, goods, war equipment, even ships and planes and sites for bases. At the end of war, such items, set against each other, help balance, and keep the debt in money to a more reasonable figure.

At the close of World War I, the nations involved owed more than $150,000,000,000, of which the national debt of the United States was $25,000,000,000. It was reduced by $9,000,000,000 before 1930, but greatly increased during the depression years. The menace of war added to it for national defense preparations, until it amounted to $55,000,000,000 when the United States entered World War II. Heavy war expenditures brought it to nearly $269,500,000,000 in 1946. Though cut slightly for a time, it later mounted again to meet the costs of the Korean conflict and of defenses against other Communist aggression.

NATIONAL EDUCATION ASSOCIATION. See Education Association, National.

NATIONAL GALLERY OF ART. One of the finest art museums in the United States, the National Gallery of Art was established in 1937 as a result of a gift that Andrew W. Mellon gave to the nation. This gift included not only his world-famous collection of thirteenth- to eighteenth-century European masterpieces, but also funds for erecting a building to house them. The building, a classic structure on the Mall in Washington, D. C., cost about $15,000,000 and is one of the world's largest marble buildings. It was opened in 1941. Other gifts housed there include the outstanding Samuel H. Kress and Joseph E. Widener collections of fine paintings and sculpture, a notable collection of prints and drawings given by Lessing J. Rosenwald, the Index of American Design, and important works of art given by Chester A. Dale, Ralph and Mary Booth, Duncan Phillips, and others. The gallery also has a fine art library and an archive of reproductions of paintings (given by Solomon R. Guggenheim) for use by scholars. It is a bureau of the Smithsonian Institution. See Smithsonian Institution.

NATIONAL GUARD. A Federally supervised reserve defense organization, the National Guard of the United States is made up of units of civilian volunteers who are recruited, trained, and maintained in each of the states and territories of the nation and in the District of Columbia. The units in each state and territory are under control of the governor; in the District of Columbia the President has control of the Guard.

Service in the Guard is voluntary, enlistment being for a three-year period, followed by three years in the organization's Reserve. The state or territory sets the age limits for its members — usually between seventeen and fifty. In peacetime, Guardsmen meet regularly, usually once each week, for drill and instruction. Each year they also receive some two weeks of field training in a camp. In times of local disaster or any other kind of emergency, a governor may call out as many of the units under his control as he deems necessary to maintain order. In case there is a war or some other national emergency, the President may draft the Guard and make it a part of the nation's regular defense forces.

The Federal Government provides the equipment and supplies for each unit, pays Guardsmen for their training periods, and may also help the states, territories, and District of Columbia to provide the armories and airfields needed.

The National Guard is an outgrowth of the state militias, first authorized by Congress in 1792. For more than a century, these were entirely under state control, although Congress had the constitutional right "to provide for calling forth the militia to execute the laws of the Union, suppress insurrection, and repel invasions." Since its establishment in 1903, the National Guard has been considered the organized section of the state militias and has been under partial Federal control. When it was completely reorganized in 1946, plans were made for enlarging it materially. The establishment of the nation's Air Force as a separate defense department after World War II led to the forming of two branches of the National Guard — the Army National Guard for training civilian ground reserves and the Air National Guard for training civilian Air Force reserves.

NATIONAL MUSEUM OF THE UNITED STATES. A branch of the Smithsonian Institution, this museum is the United States Government's largest storehouse of historical and scientific collections. Priceless exhibits trace the history of America from pre-Columbian times. Located in Washington, D.C., the museum started with a collection of minerals and other objects gathered by James Smithson and given to the Smithsonian Institution in 1846. Its first building was opened in 1881, a second in 1911, and a third in 1917. Today its anthropology and natural-history collections are especially noted. Also here are mementos of famous Americans and statuettes of the Presidents' wives. See SMITHSONIAN INSTITUTION.

NATIONAL ROAD. See CUMBERLAND ROAD.

NATIONS, LAWS OF. See INTERNATIONAL LAW.

NATIONS, LEAGUE OF. The world's first international organization of states, the League of Nations, was formed in 1919 following World War I. In that year representatives of all leading nations met at Paris, and later at Geneva, to prepare a covenant to which they agreed to adhere in order to end war and make secure international justice. Woodrow Wilson, then President of the United States, suggested the plan of the League. The League officially came into being in 1920 with the signing of the peace treaty. The beautiful Assembly Hall of the League was opened at Geneva in September, 1937. Ironically, the United States, due to internal political pressure, never joined the organization founded by one of its own Presidents.

Working Basis of the League. The League was set up through a Covenant which the nations signed, and which provided first for the organization of the body itself, and then for its functioning. The Covenant outlined the procedure whereby nations might join or withdraw from the League, and the methods for settling international disputes by means of arbitration, conciliation, or judicial processes. It listed means of handling aggressive nations. Further, it set up headquarters and machinery not only for these political aims but also for a vast amount of international co-operative work in health, social work, transport, economics, finance, drug control, education, welfare, and such fields of great importance to civic life throughout the world.

Organization. The League organization was set up to revolve around the Assembly, the Council, and the Secretariat.

The Assembly included representatives of each member country, three to a nation. Regardless of size, member states had but a single vote on a question and most matters required unanimous vote for passing. Until World War II, the Assembly met once each year for a three- or four-week session in September, with longer or special meetings when needed. The Assembly was the most powerful body of the League. It controlled membership, the budget, and the amending of the covenant, and had a voice with the Council in electing judges of the World Court.

At the beginning of World War II, the Council had as permanent members the two great powers, Great Britain and France. There were eleven nonpermanent members chosen by the Assembly from the other member states. The Council met at least every four months and had as its greatest work the keeping down of war. It also made plans for reduction of armaments, supervised the mandates over countries set up as a result of the First World War, and protected minority populations wherever the states involved were willing. Actually, while the Assembly and Council were both thus limited in their fields, they were authorized by the covenant to deal with "any matter within the sphere of action of the League or affecting the peace of the world."

The Secretariat was the permanent working staff, headed by a Secretary-General appointed by the Council, and comprising a staff of about six hundred international officials responsible only to the League itself. The Secretariat served particularly the peacetime work of the League, rather than that involved in threats of war. It published the records, summary, and official journal of the League.

Conciliation. The greatest service the League was intended to perform was to effect peaceful settlement of disputes between nations and thus prevent war. While this service was performed in some minor cases, it failed in major disputes.

The League could not prevent World War II. While it had the method and plan for conciliation, there was no power to enforce its decisions. Therefore it could not prevent the Japanese from taking Manchuria or marching into China, the Italians from seizing Ethiopia, nor the Germans from taking Austria and Czechoslovakia. Naturally, nations involved in disputes where League opinion went against them withdrew their membership.

The chief value of the League of Nations lay in its pursuits of a civic nature; these continued after the outbreak of World War II, with part of the offices removed to the United States. The League came to an end in April, 1946. See PERMANENT COURT OF INTERNATIONAL JUSTICE.

NATIONS, UNITED. See UNITED NATIONS, THE.

NAT TURNER INSURRECTION. See TURNER, NAT.

NATURAL. When the natural (♮) appears before a note in music, it is a signal to play the note at its normal pitch and to disregard either the sharp (♯) or flat (♭) which has been previously indicated for the note. The natural applies only through one measure. See MUSIC.

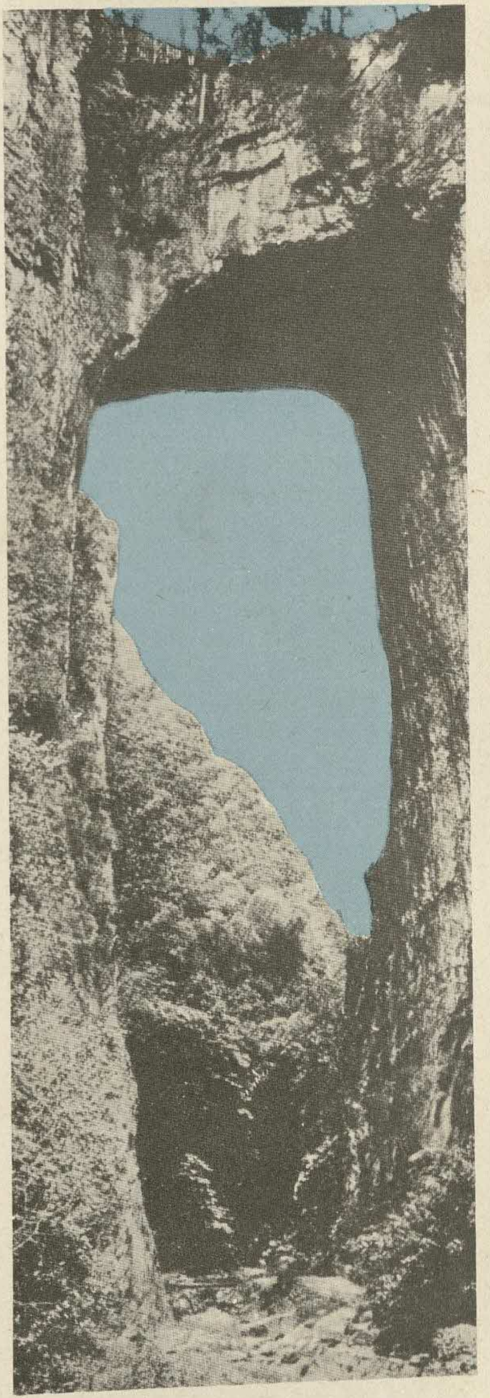
NATURAL BRIDGE. When a soft layer of rock underlying a hard layer is worn away by water or wind, leaving the harder upper layers, a natural bridge is formed. There are about fifty such bridges in the United States, usually located over streams. The most famous is Natural Bridge across Cedar Creek in Rockbridge County, Va., which has a span of ninety feet and is 215 feet high.

Several examples are also found in the Western states, including the Natural Bridges National Monument in Utah, which contains three spans; and Rainbow Bridge National Monument, also in Utah, which is 309 feet high and has a span of 277 feet. In Southern Utah there is a natural bridge carved out of sandstone by the wind; others of this type are also found in New Mexico and Arizona.

NATURALIZA'TION. One who was born in the United States might find that he wished to live permanently in England, France, or some other country. If he wanted to have the privileges of the citizens of that country, he would go through a legal process by which he would swear allegiance to the country of his adoption and would give up all the rights which were his as a citizen of the United States. This process is called naturalization, and in the United States involves several things.

An alien who wants to become a citizen of the United States must meet certain requirements. Generally he must have been lawfully admitted into the United States. He must be of good moral character and attached to the principles of the Constitution. He must be able to read, write, and speak English (unless he was over fifty on December 24, 1952, and had lived in the country twenty years or more). The residence requirements are usually five years in the United States and six months in the state where the petition for naturalization is made. For a person married to a citizen of the United States, the residence requirement is three years.

An alien who is at least eighteen years old may apply for permission to file a naturalization petition. This preliminary application is made to a court that has the right to handle naturalization cases or to an officer of the Immigration and Naturalization Service. The Service notifies the applicant to appear at a certain date with his witnesses. At this interview, an examiner checks the information given in the application and questions the witnesses as to the length of the applicant's



INDIAN "BRIDGE OF GOD"
The renowned Natural Bridge of Virginia was revered by the red men of colonial days.

residence, his moral character, and his qualifications to become a citizen.

Either the judge will examine the candidate in court or he will be notified to appear before an examiner of the Immigration and Naturalization Service. When the judge is satisfied that all requirements have been met, the candidate is asked to renounce allegiance to the government from which he has come and to take the oath of allegiance to the United States. At this time one may change his name legally, and often foreigners with difficult names adopt an English form of their name.

To pass the examination for citizenship, a foreigner must be able to speak English, to write his own name and sign his own petition, if he is physically able to write, and must have a satisfactory knowledge of the provisions of the Constitution and the methods by which the government is conducted.

Prior to 1922, the wife and minor children of an alien secured citizenship through his naturalization. Since that time, however, the wife of a citizen must herself become naturalized, although she no longer need file a declaration of intention. She must live in the country with her husband for a specified period. This would also apply, however, to the alien husband of a woman who was an American citizen. On May 24, 1934, a law was signed by the President which gives women equal nationality rights with men. A woman no longer loses her citizenship by marriage to an alien, and her children derive the same rights of citizenship through her as they formerly did through their father. This law was passed in conformity with a convention signed by the member governments of the Pan American Union at Montevideo.

The United States does not recognize renunciation of citizenship in time of war, nor within a year preceding the declaration of war.

NATURAL SELECTION. According to the theory of natural selection, those plants and animals best adapted for living in a particular area, under the conditions existing there, survive and gradually replace those less suited. In this manner, new varieties replace old, and plants and animals tend to evolve into higher forms.

Natural selection does not take place suddenly, but involves the "struggle for existence" and the "survival of the fittest." If natural selection does take place, it would be noticeable only over a period of several generations. It could not occur if the individuals of each generation were exactly like their parents. Because children are not exactly like their parents, natural selection is constantly going on among human beings. Charles Darwin first advanced the theory of natural selection, which, however, has not been entirely accepted by all scientists. See DARWIN, CHARLES R.; EVOLUTION; HEREDITY.

NATURE STUDY. One of the most fascinating of all pursuits is nature study. This study includes the sciences of botany, zoölogy, geology, and physiography, but combines the actual observations of the student with the technical knowledge obtained from books.

Nature study trains the student's powers of observation; adds to his knowledge of the structure and characteristics of natural objects; shows the importance of conservation of natural resources and wild life; and teaches the relation of plants to animal life and the effect of the geographical location upon both. It trains the memory as well as the reasoning powers. Nature study is now an important part of school work. In addition, such organizations as the Boy Scouts, Girl Scouts, and Camp Fire Girls are active in training boys and girls in this work.

Consult the following titles for additional information:

Agriculture
Astronomy
Birds
Botany
Boys' and
  Girls' 4-H Clubs
Fish and Fisheries
Flowers
Geography

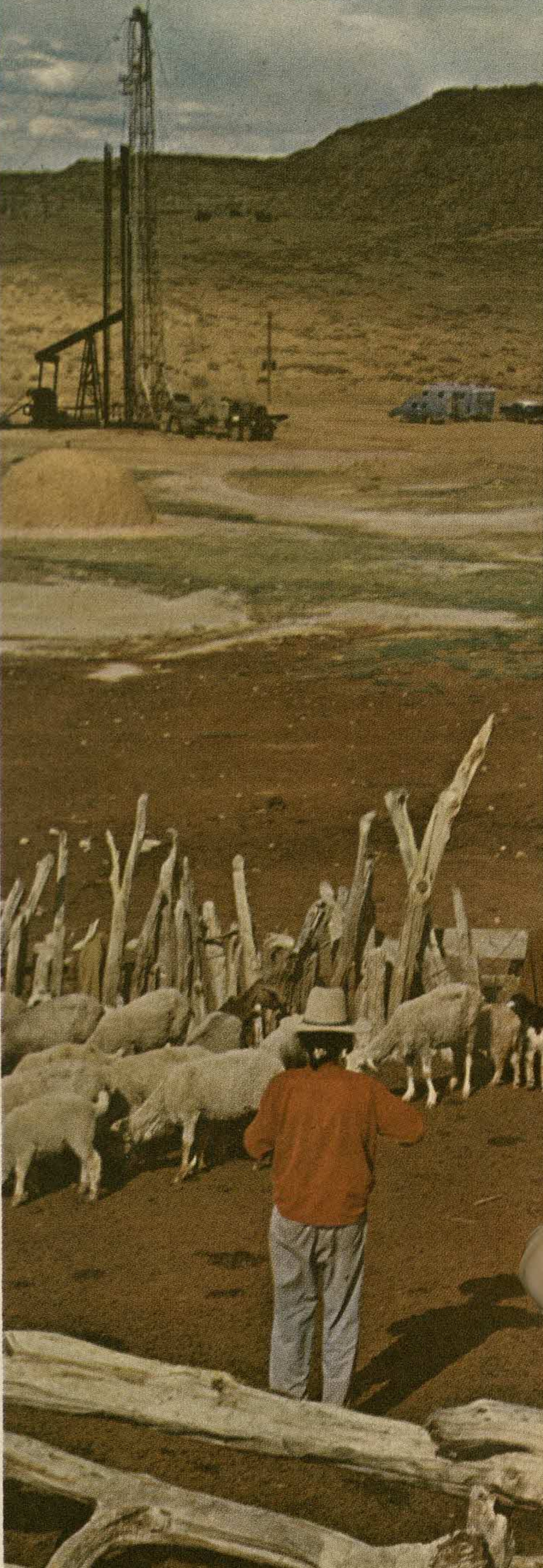
Geology
Germination
Grasses
Insects
Plant
Seeds
Tree
Weeds
Zoölogy

NATURE WORSHIP, primitive religion built around worship of animals, plants, fire, heavenly bodies, and other natural objects. For further information, see MYTHOLOGY, with *Related Articles;* RELIGION.

NAUTILUS. The chambered, or pearly, nautilus belongs to the class of mollusks known as *cephalopods.* The few existing species are found in the South Pacific and Indian oceans. This marine animal lives on the bottom of the sea and seldom rises to the surface. It lives in a shell which it enlarges every year. As it builds a new chamber, or compartment, it moves from the old chamber, which it closes with a partition. As the shell grows, it becomes a flat, spiral coil. The chambers are connected by a slender tube, and each one is filled with air. The nautilus feeds on small shellfish which it picks up with about ninety tentacles around its mouth.

NAVAHO, or **NAVAJO,** *nav' uh ho,* one of the most populous Indian tribes still existing in North America. About 53,000 live on reservations in Arizona and New Mexico. About 8,000 more are farmers and shepherds living in the surrounding territory. Navaho rugs and blankets, woven by the women of the tribe, are well known for their bold designs and gay colors. The men make handsome jewelry, working with silver and turquoise.

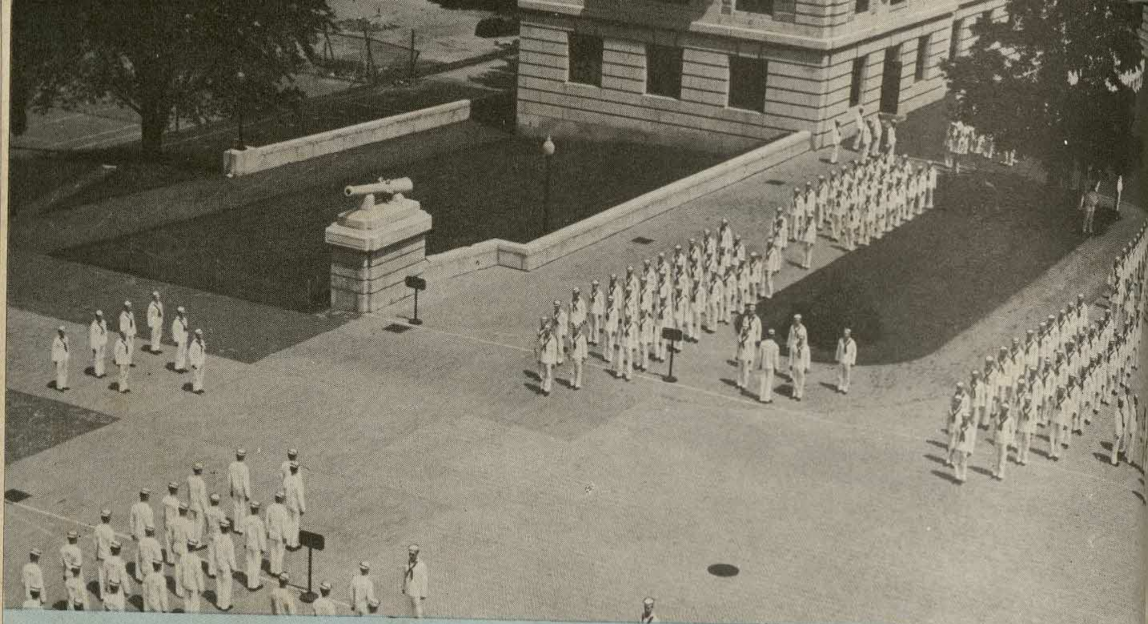
The Navahos formerly were a warlike tribe, attacking the Pueblos and other people of the region. In addition to being warriors and hunters in the early days, they also were farmers at times; and after the Spaniards brought horses, they



NEW WEALTH FOR OLD TRIBE

The shepherd and his flock are a familiar sight in the Southwest. For years, the Navaho Indians have struggled to make a living on their barren land by raising sheep and farming. The oil derrick in the background has become a symbol of easier living. Each member of the tribe shares in the income from oil produced on the reservation, though sheep raising is still a part of the Navaho's way of life.

Sun Oil



Official U.S. Navy Photo from Ewing Gallow

TODAY'S LOWLY PLEBES MAY BE TOMORROW'S ADMIRALS

Drawn up before historic Bancroft Hall, these first-year men at the United States Naval Academy are preparing for one of three daily inspections. They are undergoing strict discipline and arduous training in preparation for the responsibilities of the future.

became horsemen like the plains Indians. The Navahos live in houses made of a round frame of logs, thickly covered with adobe clay. Usually there is a large hole in the roof for smoke; and a door, but no windows. These houses are called *hogans.* The Navaho men do not weave, leaving this work to the women.

NA'VAL ACAD'EMY, UNITED STATES. Until the United States Naval Academy was founded, the officers of the United States Navy were recruited from the ranks, composed, usually, of uneducated youths from farms, workshops, and factories. Training was haphazard, promotions to the rank of lieutenant were by favor, and the method of maintaining the personnel of naval vessels was unsatisfactory. George Bancroft, Secretary of the Navy under President Polk, disliked these conditions; so in 1845 he laid the foundations of the present Academy by establishing the Naval School at Annapolis, Md. In 1850 the school became the United States Naval Academy.

The students, called midshipmen, take a four-year course (shortened to three years in wartime) and are graduated as ensigns in the navy. During the summer the three upper classes go to sea for about three months or receive aviation training. Each midshipman receives a salary while attending the academy, but out of this he must pay for uniforms and books.

Appointments to the academy are made according to the following apportionment: five for the Vice-President and for each Senator, Representative, and Delegate in Congress; five from the District of Columbia and five from Puerto Rico; four from the Republic of the Philippines, designated by the President of the United States; one from the Canal Zone; seventy-five from the United States at large, appointed by the President; 160 from the Navy and Marine Corps and 160 from the Naval Reserve and the Marine Corps Reserve; twenty from honor military schools and NROTC units; forty sons of members of the armed forces who met death as the result of wartime service; one native Puerto Rican; twenty from the other American republics and Canada; and an unlimited number of sons of Medal of Honor winners.

With a few obvious exceptions, candidates must be citizens and must be between the ages of seventeen and twenty-two. All candidates must be at least five feet, six inches tall and at least 120 pounds in weight. They also must be unmarried. Congressional nominees for admission to the academy may qualify on the basis of their high-school and college records. Others may qualify by presenting acceptable high-school certificate and then passing examinations in English and mathematics. A third method of gaining entrance is by passing the regular entrance examination. A special aptitude test is taken by all candidates. Each midshipman must agree to accept a commission and serve at least three years after graduation.

NAVAL OBSER'VATORY. Invaluable information concerning navigation and astronomical discoveries is compiled at the United States Naval Observatory located at Georgetown Heights, Washington, D. C. The observatory is under the Bureau of Navigation of the Navy Department. Here the *American Ephemeris and Nautical Almanac* is prepared, reports and articles concerning astronomical subjects are issued, and correct time is kept and broadcast. The observatory is equipped with many of the latest and most exact astronomical instruments, particularly a twenty-six-inch equatorial refracting telescope that was the largest in the world when it was installed in 1873.

NAVAL RESERVE. The United States Naval Reserve was established in 1915. It consists of the Fleet Reserve, Organized Reserve, the Merchant Marine Reserve, and the Volunteer Reserve. It is composed of male citizens of the United States and its insular possessions, seventeen years of age or over, who by appointment or enlistment obligate themselves to serve in the navy in time of war or in a national emergency. The Naval Reserve enlists and trains its personnel in the particular branches for which the men are best suited. The Fleet Reserve makes annual cruises.

NAVARRE, *na vahr'.* An ancient kingdom which produced one of France's greatest kings was Navarre. Today it is the province of Navarra in Spain, bordering on the southern side of the Pyrenees. In the old days, however, its territory also included land on the other side of the mountains. The western portion was annexed to Castile in 1512 by Ferdinand the Catholic; the other part went to France when Henry of Navarre became king of France. The province today has an area of 4,055 square miles and a population of about 371,500.

NAVIGA'TION. With charts, compass, sextant, chronometer, and other instruments, captains of ships are able to determine their position at sea, the course they are following, and the speed they are making. The proper use of these instruments and informative devices is the art of navigation. The direction is determined by the compass, which always points in a northerly direction; the rate of speed is obtained by the log, a mechanical device for determining speed; and the position is obtained by means of the sextant, chronometer, and printed data. The charts show the nature of the course, including harbors and landfalls.

For additional information, consult the following articles:

Chart
Chronometer
Compass
Declination
Log
Sextant

NAVIGATION ACTS. Important among the causes of the American Revolutionary War were the Navigation Acts, legislation passed by the British Parliament, which restricted colonial industry and trade and tended to encourage smuggling. An act passed in 1651 provided that all products, no matter where they were from, could be taken to England only in English ships. Another navigation act, passed in 1663, provided for a heavy duty on all goods imported by the colonies not shipped from English ports; it also provided that certain American goods be shipped to England. Still other navigation acts levied duties on goods shipped from one colony to another, and on goods manufactured in the colonies. See REVOLUTIONARY WAR IN AMERICA.

Official United States Navy Photo

NAVY. A branch of a nation's armed forces, a navy is composed of ships of varying sizes and design, of shore installations, and, in many cases, of ship- and shore-based aircraft, as well. In order to operate all these, a navy must, of course, have its trained officers and men, and in some countries its personnel includes women.

Throughout history, maritime nations have used their navies to protect their shores and their overseas commerce against enemy attackers, both real and would-be. In many wars, naval victories and losses have determined the final outcome. Battles waged on the high seas, the battering of enemy shores by naval guns, the bombing of foes by planes based on aircraft carriers, and the convoying of transport ships carrying troops, supplies, and war equipment—all are part of modern naval warfare. So too is the blockading of coasts to keep ships, soldiers, and goods from entering or leaving enemy harbors.

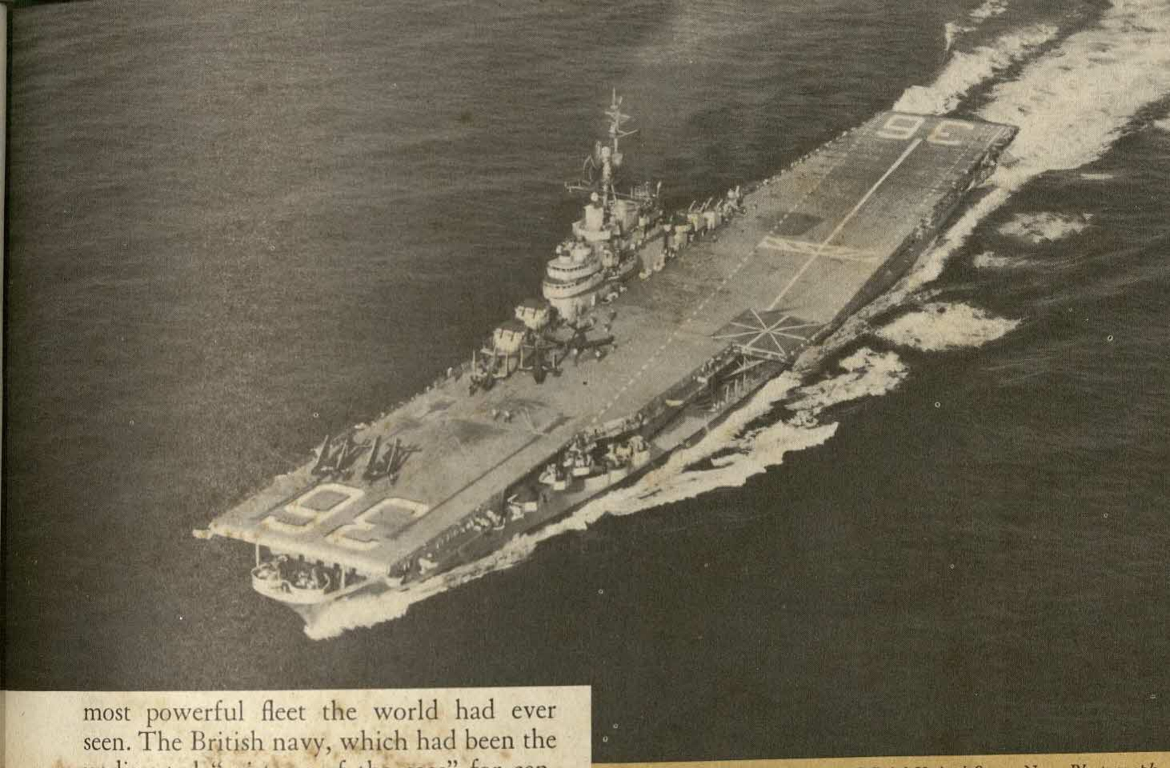
Although the Battle of Jutland was the only major naval engagement fought during World War I, the Allies' superior sea power played an important part in making them victorious. When the Allied blockade kept the enemy's surface vessels bottled up in their home ports, Germany resorted to unrestricted submarine warfare against both neutral and enemy ships. The Allies' subchasers, destroyers, torpedoes, minelayers, minesweepers, underwater sound detectors, convoy system, camouflage, and smoke screens — all developed or improved during the war — played a major role in Germany's defeat.

In World War II, navies were far more important, and both sides suffered heavy losses as their ships and fleets battled for supremacy. Of all the new developments introduced during that conflict, the most important was the aircraft carrier, from which warplanes flew out to strike the enemy. As a result, the giant battleship, with its heavy guns, became far less important, and most nations began to consider the aircraft carrier the backbone of the modern navy.

When World War II ended, the United States two-ocean navy, rapidly enlarged and improved during the conflict, was the most powerful fleet the world had ever seen. The British navy, which had been the undisputed "mistress of the seas" for centuries, ranked second in naval might; but it was later outstripped by Russia's fleet, which was especially strong in submarines. Meantime the development of atomic engines and weapons and of guided missiles had begun to change the thinking of naval experts everywhere. The nature, strategy, and tactics of navies seemed destined to undergo many revolutionary changes.

Ships. Naval vessels range from huge battleships to small, unarmored craft. Battleships, the most powerful combat vessels, displace up to 45,000 tons, can reach speeds of over thirty-three knots, are thickly armored, and carry giant, high-caliber guns. *Battle, heavy,* and *light cruisers,* more lightly armored and very fast, are especially useful as scouters and raiders and as protectors of aircraft carriers and other vessels. *Destroyers,* small, very speedy, and highly maneuverable, are excellent antisubmarine fighters. *Destroyer escorts* are convoy ships capable of fighting submarines.

The *aircraft carrier* is a huge vessel, with storage space and a flight deck for planes—actually a floating air base. *Escort carriers* are smaller and are often called "baby flattops." *Submarines,* which can travel submerged, are used chiefly for torpedoing enemy shipping. Other naval craft include *gunboats, corvettes, transports, torpedo boats, frigates, minelayers, minesweepers, tugs, icebreakers,* and *repair, supply,* and *patrol ships.*



Official United States Navy Photograph

MOBILE AIR BASE

One of the foremost weapons of the modern navy is the aircraft carrier, which can either guard a nation's coast or transport planes to within striking distance of any enemy.

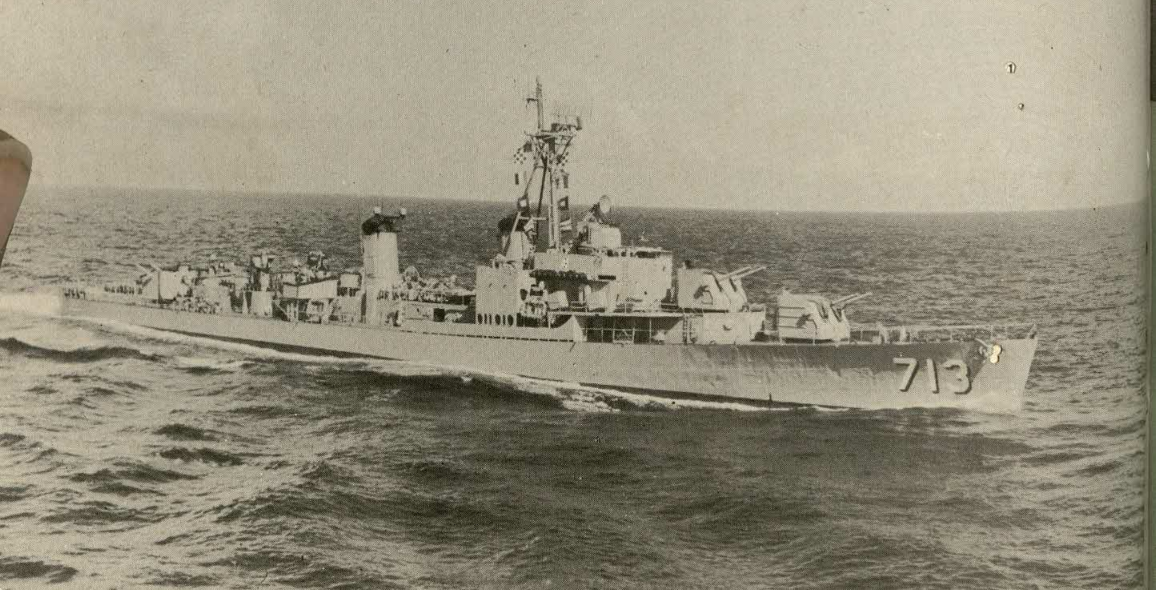
Landing craft, developed in World War II, are flat-bottomed vessels of shallow draft, capable of driving up onto enemy beaches, delivering their cargoes, and then clawing themselves off in a hurry. Some are so small that they carry only a few men or weapons; others are great floating garages, whose bows can be lowered to form large gangplanks. Some can cross oceans; others have to be carried across on larger vessels; and some are amphibious, traveling on either land or water.

History. Navies originally consisted of all the ships belonging to a nation, whether for war purposes or for commerce. The early Phoenicians, Greeks, and Romans had navies; the Italian republics also maintained fleets. The British Navy dates back to Alfred the Great, who built a fleet of ships to defend his lands against the Danes. Later, Henry VIII created a fleet and provided facilities for building and maintaining vessels. Elizabeth followed his example and encouraged the privateers who formed a large part of the navy. Spain early had a large navy which, despite the defeat of the Armada in 1588, was a force in the eighteenth century.

The earliest naval vessels, of course, were the galleys, propelled by oars. Sailing ships replaced these vessels. When gunpowder came into use, cannon were mounted on the decks. Still later came the line-of-battle ship, which was fully armed; and the frigate, which had smaller cannon but was faster in sailing. All vessels were constructed of wood until 1862, when the *Monitor* and the *Merrimac* revealed the advantages of armor-clad vessels. After that, navies were composed of steel vessels, increasing in size and armament until the present day.

The American Navy. In the United States, the navy originated in 1775 when Congress voted $100,000 for the purchase of ships. For a number of years the Navy Department was administered by the War Department. In 1798, however, the office of Secretary of the Navy was created. In 1845 the United States Naval Academy was founded for the training of officers.

Besides antiaircraft weapons, American battleships now carry from 21 to 29 guns ranging in size from 5 to 16 inches in



PLENTY OF WATER TO SCRUB WITH

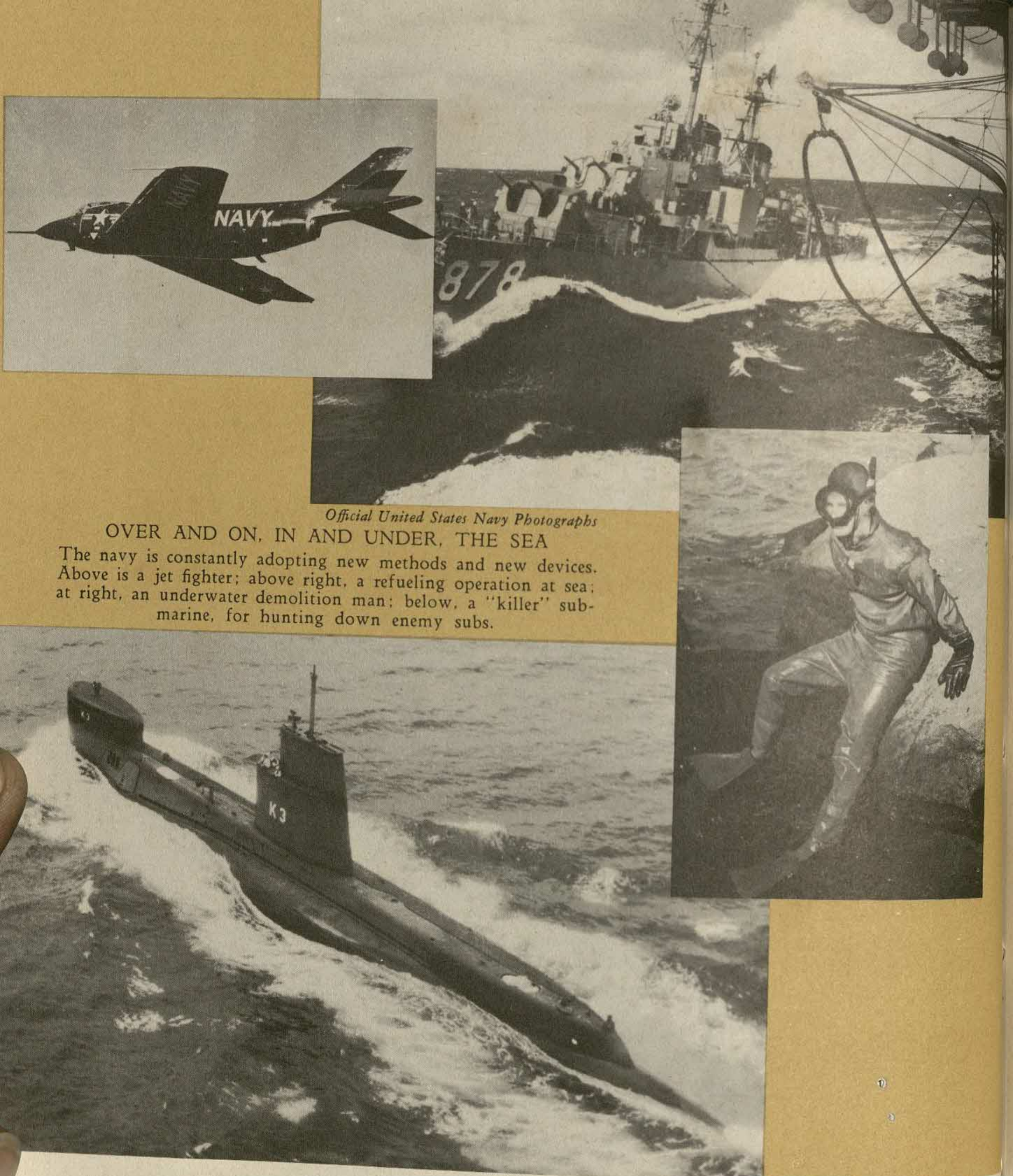
Below, a speedy destroyer slices through a quiet sea. At left, seamen in dungarees swab the deck of a heavy cruiser in the shadow of the ever-ready big guns.

U.S. Army Photograph; Official U.S. Navy Photograph

General Precision Equipment Corp.

FROM SEA CANYONS TO SPACE, THE NAVY SERVES

For hundreds of years a navy was made up of boats and ships, and the fighting men on them. A great sea power was said to "rule the waves." A modern navy also sails the seas, and in a great variety of ships and boats. But a modern navy operates not only on the water, but under it and over it. Navy aircraft fly the skies, some from land bases and some from huge flat-topped vessels called aircraft carriers. Some of the navy submarines are driven by atomic power. And above the three layers under, on, and above the water, the rockets are propelled beyond the skies, and without human crews, to bring back data on outer space. Electronic devices serve the navy as long-distance eyes and ears. The officer in command of operations may be thousands of miles away, yet constantly in control of what is going on. The navy trains men in thousands of different technical skills.



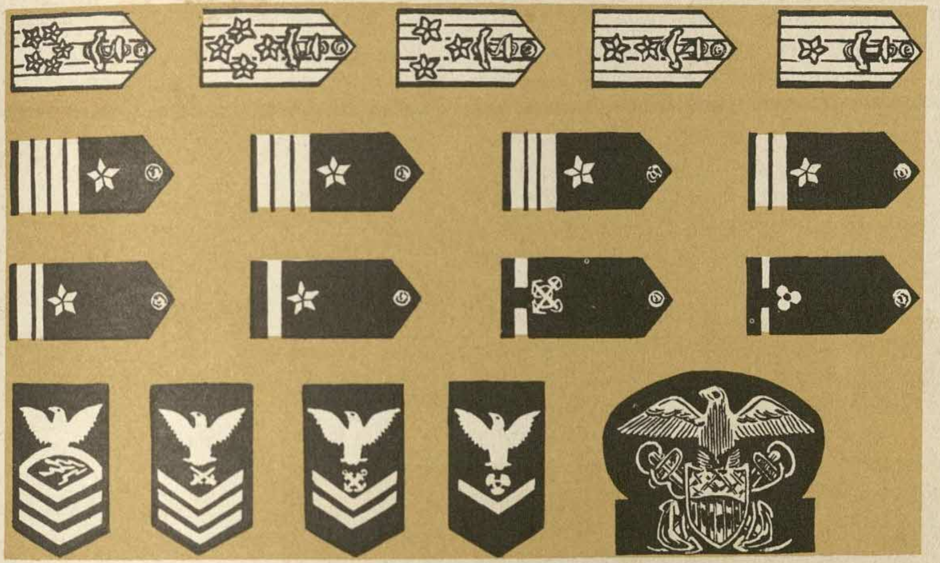
Official United States Navy Photographs

OVER AND ON, IN AND UNDER, THE SEA

The navy is constantly adopting new methods and new devices. Above is a jet fighter; above right, a refueling operation at sea; at right, an underwater demolition man; below, a "killer" submarine, for hunting down enemy subs.

diameter. The navy's huge battleships include the *Missouri* ("Mighty Mo"), the world's largest vessel of its type. In addition, it possesses so many fine aircraft and escort carriers, cruisers, destroyers, escort destroyers, frigates, submarines, minelayers, minesweepers, and other craft that its fleet has been rated as the largest in the world ever since the end of World War II. When it launched the *Nautilus,* the world's first atomic submarine, in 1954, it had other atomic-powered craft under construction. Its personnel includes women as well as men.

At the head of the navy is the President of the United States, who by his office,



INSIGNIA OF THE UNITED STATES FLEET

Naval rank is shown by insignia. Top, left to right: admiral of the fleet, admiral, vice-admiral, rear admiral, commodore. Second row: captain, commander, lieutenant commander, lieutenant. Third row: lieutenant (j.g.), ensign, chief warrant officer, warrant officer. Bottom: petty officers, chief, first-class, second-class, third-class; officer's cap device.

is Commander in Chief. His orders are given through the Secretary of Defense. Besides the Naval Academy at Annapolis and the Naval War College at Newport, R.I., there are several training centers, the largest being the one at Great Lakes, Ill., near Chicago. The navy also has shipyards; naval, experimental, and air stations, and amphibious and submarine bases. Besides its establishments along the coasts of American territory, the navy operates bases in foreign lands, through defense agreements with their governments.

For additional information, consult:

- Battleship
- Blockade
- Marine Corps
- Monitor and Merrimac
- Naval Academy, United States
- Naval Observatory
- Naval Reserve
- Navy, Department of the
- Privateer
- Rank
- Submarine
- Submarine Mine
- Torpedo
- Torpedo Boat
- World War (I, II)

NAVY, Department of the. Every maritime nation has a department of the navy, devoted to the management of the ships and sea forces of the country. In the United States, the Department of the Navy is a branch of the Department of Defense, founded (as the National Military Establishment) in 1947. Its head, the Secretary of the Navy, was a member of the President's Cabinet until that year, but is now under the direction of the Secretary of Defense, who, in turn is under the President. See Cabinet.

NAZ'ARETH. The boyhood home of Jesus, Nazareth is a small town in Israel, picturesquely nestling against the slopes of two of the tree-clad Hills of Galilee. Though motor cars are now seen here, camels still tread its narrow streets, between rows of flat-topped stone houses. Near an Arab bazaar is the Latin Church of the Annunciation, where Mary's home is said to have stood. Women still carry water in jars balanced on their heads from the spring known as Mary's Well, an undisputed Biblical site.

NAZISM, *nah' tsiz'm*. From 1933 until May, 1945, Germany was under the control of the National Socialist Party, which called its system of political and social beliefs Nazism. This German system was patterned on and closely resembled Italian Fascism, but became even more dictatorial, especially in its racial, social, and religious regulations. At a time when the existing form of government—a postwar presidency under an aging war general—failed to satisfy the people, the National Socialist Party seized power by a series of audacities created a totalitarian state, and made Germany once more a world power.

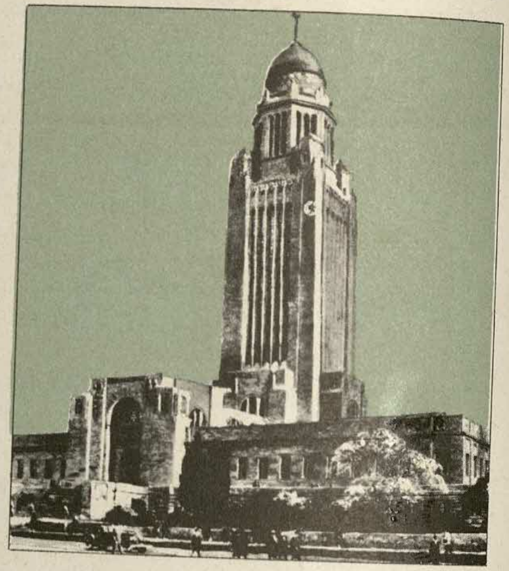
Under an extremely centralized government, Nazism glorified the state through *Der Fuehrer.* (the leader), Adolf Hitler. Extreme nationalism was displayed in the one political party only, the training camps for boys and girls, the special political army (Storm Troops), and the complete control of education, press, and radio.

All religious worship was put under the control of the Reich, and the pure Germanic (Aryan) race was exalted. Persecuting the Jews became a national aim. Pan-Germanism, the uniting of all German peoples, was made a part of the plan to build a Greater Germany embracing all Central Europe. To do this, the Nazis took over what territory, resources, and industries they felt to be necessary to give *Lebensraum* (living-space) to the Germans. This was offered as the excuse for incorporating Austria into the Reich, absorbing Czechoslovakia, conquering Poland, and involving both hemispheres in World War II.

The war brought out the fanaticism and excess of Nazism. Propaganda kept the support of the German people while conquered peoples were bled of riches, raw materials, goods, art treasures, and even food. Able-bodied men and women were taken for slave labor in German industries. Political and war prisoners were starved, tortured, and executed. With the occupation of Germany by the Allies in May, 1945, Nazism was defeated and measures were begun to stamp it out.

For additional information, consult the following articles:

Fascism	Hitler, Adolf
Germany	Italy



HOME OF ONE-HOUSE LEGISLATURE
The ten-million-dollar capitol at Lincoln, seat of government of Nebraska.

NEBRAS'KA. One of the states in the central-plains region of the United States is Nebraska, popularly known as "the Cornhusker State." It is also known as "the Tree Planters' State," for it was here that Arbor Day was originated to create forests on the treeless plains. Nebraska is one of the nation's agricultural storehouses, for from its thriving farms come huge quantities of corn and wheat and cattle. It lies in the great basin of the Missouri River, where in past ages glaciers deposited deep, fertile soil which today constitutes the state's greatest resource. The area of the state is 77,237 square miles.

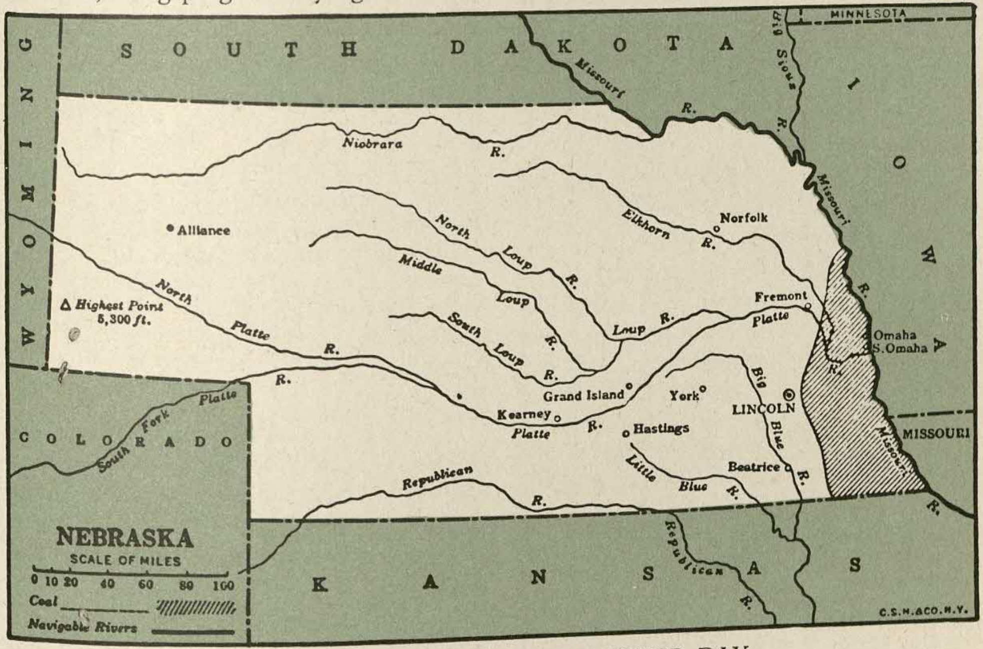
Features of the Landscape. It is commonly thought that Nebraska is made up of gently rolling prairies, but Nebraska has a variety of topographic features. The state lies on the slope of the Rocky Mountains, rising gradually from the eastern border at the Missouri River to the Wyoming boundary line on the west. The rolling prairies are found in the eastern part. West of the prairies is a vast, level plain that stretches across the southern part of the state. In the north the plains are surrounded by sand hills, which have shallow valleys and marshes and lakes in some sections. Western Nebraska is a high plateau, broken occasionally by hills and valleys, which in some places are very rugged and deep. In the extreme northwest is a part of the fantastic Bad Lands, which extend into South Dakota.

Since the state slopes to the east, it drains chiefly to the Missouri River at the eastern boundary. The principal river within the state is the Platte, which flows across the state to the Missouri. Other important streams are the Niobrara, the Republican, the Elkhorn, the Loup system, and the Big and Little Blue rivers.

Climate. Because of Nebraska's size there is considerable variation of climate in different parts of the state. The main features of the climate are the dry atmosphere, the wide ranges in temperature, and relatively light rainfall. The average temperature is about 48°F., although the temperature often rises to 100° in summer and falls well below zero in winter. The rainfall is unevenly distributed throughout the state, being progressively lighter to the west. The yearly average for the state, however, is about twenty-four inches.

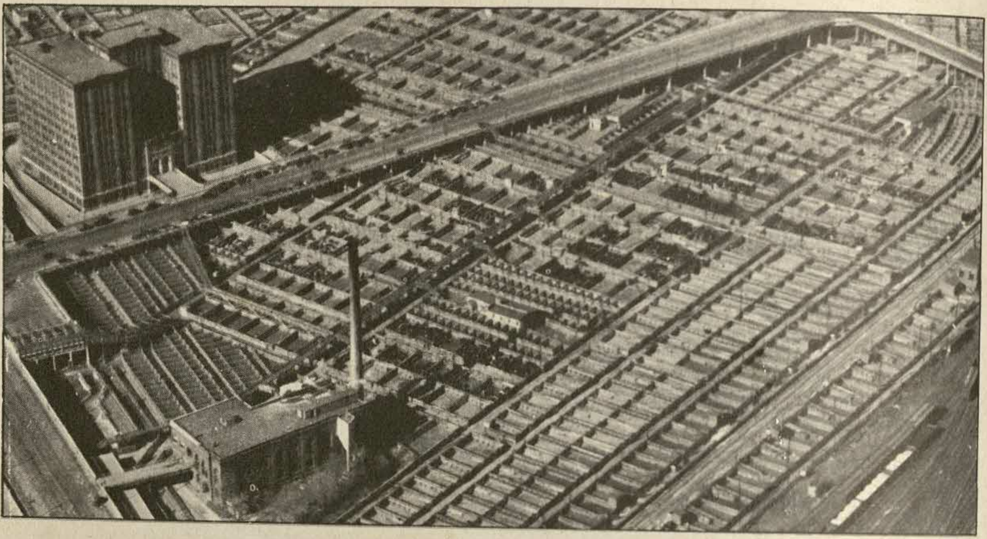
Natural Resources. Nebraska has almost no metals, but it does have petroleum and natural gas, as well as sand, gravel, and stone. Sand and gravel occur in the river valleys, mainly in the valley of the Platte. Limestone and sandstone quarries are found in nearly all parts of the state. Many deposits of clay are suitable for the manufacture of brick and tile. Potash is obtained in the alkali lakes in the western part of Nebraska. There are also large supplies of pumice stone and cement rock in many localities.

Farming in Nebraska. That Nebraska is primarily an agricultural state is shown by the fact that about ninety per cent of the total area is devoted to farming. The principal crop is corn. Of great importance, too, is the production of sugar beets. Wheat, in which Nebraska ranks fourth among the states, is next to corn among the field crops, followed by oats, alfalfa, hay, barley, and rye. Potatoes are also raised extensively. Because of the



THE STATE THAT GAVE US ARBOR DAY

Nebraska is known as "the Tree Planters State" because of its forestation program. More than 3,300 species of trees, grasses, and shrubs constitute the state's plant empire.



OMAHA, A WORLD-FAMOUS MEAT MART
An aerial view of the Nebraska city's giant stockyards, where millions of cattle, hogs, and sheep are received and processed for market each year.

poorly distributed rainfall, some sections of Nebraska require irrigation.

Livestock raising is an important part of the agricultural industry. It is carried on in all parts of the state, although it is more extensive in the western section's vast grazing areas. Beef cattle are most important; but hogs, dairy cows, sheep, horses, and poultry are also raised in great quantity.

Manufacturing. Because Nebraska has such a well-developed agricultural industry, most manufactures are based on the agricultural products. The leading industry is slaughtering and meat packing. Omaha, the center of the industry, is one of the leading meat-packing cities in the United States. Second in importance is the manufacture of flour, and in third place is the manufacture of butter and dairy products. There are also a number of sugar-beet factories, as well as plants for the canning of fruits and vegetables.

Transportation. Most of Nebraska's commerce is carried on by means of the excellent railroad facilities within the state. Several trunk lines extend across the state, and there are also north-south lines, which together furnish adequate rail communication for farming areas. The highway system is well developed, and a great deal of freight moves by motor truck. Bus and air transport is very important, too.

The People and Their Government. Because it is chiefly a farm state, Nebraska has a low density of population, about seventeen to the square mile. There are few foreign-born groups, most of the population being native whites. The population is more than 1,413,000. The largest cities are Omaha and Lincoln (the capital), Grand Island, Hastings, and North Platte.

The people of Nebraska did an unusual thing when they voted in 1934 to have a single-house legislature instead of the bicameral legislature common to all other states. This plan went into effect in 1937. The legislature is now composed of forty-three members. The governor and all other state officers are elected to serve for two years. The judiciary is headed by a supreme court.

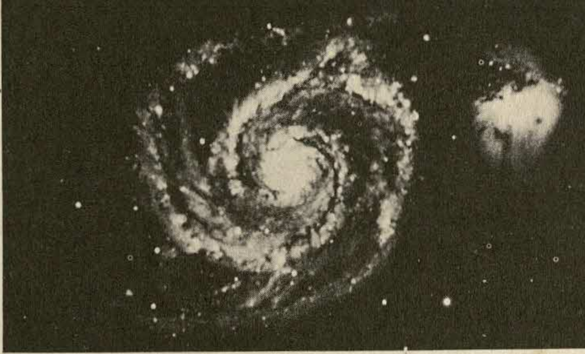
Education. The public-school system is under the general supervision of a state superintendent. The state schools are supported by the sale of public lands and taxes. The law requires that children between the ages of seven and sixteen attend school. The University of Nebraska heads the system, and there are in addition four state teachers' colleges. Other institutions of higher learning are Creighton University, Midland College, Doane College, Nebraska Wesleyan University, the University of Omaha, and Hastings College.

History. It is possible that Coronado in 1541 reached what is now Nebraska and was thus the first white man to visit the land. Although there was some exploration in the years following, not much was done until the territory was acquired by the United States in 1803 as part of the Louisiana Purchase. Nebraska was explored by Lewis and Clark in the following year, but the first permanent settlement did not come until 1823 at Bellevue. Before long, both Omaha and Nebraska City were also established. Nebraska was at one time a part of the Missouri Territory, but in 1854 it was organized as the Nebraska Territory. Then began a fierce battle on the slavery issue (see KANSAS; KANSAS-NEBRASKA BILL). Nebraska became a state in 1867, and Lincoln was made the capital in the same year. See LINCOLN; OMAHA.

NEBUCHADNEZZAR, *neb u kad nez'-ur.* Babylon reached the height of its glory and power under Nebuchadnezzar, king of the ancient land from 604 to 561 B. C. It was during his reign that the famous Hanging Gardens were built for his wife; that the Jews were conquered and taken into captivity; and that Syria and Palestine were subdued. Nebuchadnezzar also sacked the temple at Jerusalem and invaded Egypt. Nebuchadnezzar was a progressive king, building temples, aqueducts, and palaces. See BABYLON; BABYLONIA.

NEB'ULA. Certain hazy, cloudlike masses found among the stars, but which are not themselves composed of separate stars, are known as nebulae. The term comes from a Latin word meaning *mist.*

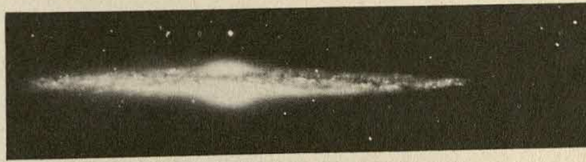
True nebulae are those which occur within our own Galaxy, or stellar universe; they are called galactic nebulae. These nebulae are composed of great masses of gaseous matter and are classified as *dark* nebulae, *diffuse* nebulae, and *planetary* nebulae. The dark nebulae have been found only in the Milky Way; they are the dark spots which conceal some of the stars. Diffuse nebulae are shapeless masses which look like clouds. They are luminous; that is, they reflect the light of the stars, and so it has been possible for astronomers to study them. Planetary nebulae have more definite shapes and as a rule surround a star; they, too, are luminous.



ISLAND UNIVERSES

A spiral nebula is actually a huge group of stars that forms a separate universe from ours. These groups are outside our own galaxy. Seen on edge, below, this island universe appears as a luminous disc floating in outer space.

Yerkes Observatory



In addition to the true nebulae there are extragalactic nebulae, which are outside our own Galaxy. They are also known as spiral nebulae or island universes. Actually, they are huge groups of stars which form different universes from ours, and they are so far away that they look like nebulae. There are millions of these island universes; but the only one visible to the naked eye is Andromeda, about 800,000 light years away. See ASTRONOMY; MILKY WAY.

NEB'ULAR HYPOTH'ESIS. Among the older theories of the origin of our solar system, the nebular hypothesis was probably the best known. According to this theory, the ancestor of the sun, and of the planets and their satellites, was an immense nebula, or mass of hot gaseous matter, that extended far beyond the present limits of the solar system. Rotating about its center, in the same direction as that taken by the planets about the sun, this mass gradually cooled and contracted, the reduced size making it turn about more and more rapidly.

Eventually, rings of this gas were thrown off at intervals; these, cooling and contracting, formed the planets, many of which in turn cast off smaller masses, making their satellites. (Saturn is a planet with rings of gas still about it.) The central mass remaining after the various masses were thrown off formed the sun.

The nebular hypothesis was suggested by Laplace, a French astronomer, in 1796, having been previously proposed in substance by Kant in 1755. Though the hypothesis was almost universally accepted for many years, it has been generally abandoned for the planetesimal theory or modifications of that theory. See GEOLOGY.

NECKER, *na kair′,* JACQUES (1732-1804). During the troubled times preceding the French Revolution in 1789, Necker was Director General of Finances in France, a position which he capably filled. At the age of eighteen he became a clerk in a Paris banking house, eventually becoming a banker himself. In 1777 he was placed in charge of his country's finances and was assigned the overwhelming task of funding France's large national debt, making loans, and reforming the taxation system.

Necker's suppression of state corruption made him unpopular at court. He resigned in 1781 and went to Switzerland. His successor, Calonne, made little progress, and Necker was restored in 1788; but again, in 1789, the king's advisers had the reformer banished. Paris rose in arms and stormed the Bastille prison in protest, forcing the king to recall Necker to his former post. Necker was unable to cope with the growing political unrest, however, and in 1790 gave up his position. He spent his final years in Switzerland, the country of his birth. His daughter, Madame de Staël, later wrote the story of his life. See FRENCH REVOLUTION.

NECTAR, *nek′tur.* In the days when Zeus and all the other gods of Mount Olympus were thought to rule the world, they were said to have a wonderful drink, delicious and fragrant, and wonderfully sustaining. It was called nectar. Today we give the same name to the hidden secretion of flowers, from which bees distill honey. Flower nectar serves a useful purpose, attracting insects and birds which carry pollen from one flower to another.

NEG′ATIVE. When we take our photographic films and plates to a photographer to be developed, he places them in a solution which fixes, or makes permanent, the impression made on the film. Films which have been so processed are known as negatives. In a negative, light and shadows are the reverse of what they will be in the final picture; that is, light areas appear dark in the negative, while dark areas appear light. The positive, or print, of a picture is made from the negative. See PHOTOGRAPHY.

NEGOTIABLE, *ne go′shi a b′l,* **PAPER.** Documents having money value, which represent money and may be transferred by endorsement or delivery, are called negotiable paper. Common examples are checks, notes, drafts, bills of exchange, bills of lading, and government and corporation bonds, when suitably worded.

The most widely employed form of paper easily passed from one person to another is the bank check. A check is made negotiable by the maker, who uses the words "Pay to the order of," or their equivalent. Negotiable paper, however, is not legal tender (see MONEY).

For additional information, consult the following articles:

Banks and Banking
Bond
Check
Clearing House
Draft
Exchange
Promissory Note
Trade Acceptance

NEG'RO. Before the days of exploration by Europeans, most Negroes lived in African tribal groups. Beginning about 1500, they were forced to spread to the Americas and parts of Europe. Now, there are more than 15,000,000 Negroes in the United States. They live both in the former slave-holding South and in the metropolitan centers of the North.

The Negroes were brought to the Americas and elsewhere because of the desire for slaves on the part of plantation owners and other white people of the time. They were required to work for white masters with little chance of gaining freedom, though sometimes they did achieve it.

There was a feeling against slavery among many people in the colonies. Six thousand Negro soldiers fought in the Continental army during the Revolutionary War. Continental Congress passed a resolution condemning slavery and the first Anti-Slavery Society was organized by Benjamin Franklin in 1774. Crispus Attucks, a Negro who had gained his freedom, was one of five colonials who died in the Boston Massacre.

Slavery was abolished in the British Empire in 1833. In 1863, the Emancipation Proclamation began the establishment of freedom for Negroes in the United States. The feeling against slavery had been growing constantly stronger up to the time the Civil War began in 1861. Some Negroes had been taught to read and write. Some had become skilled artisans. The majority, however, were uneducated farm workers.

Increased educational opportunities provided by schools such as Hampton and Tuskegee Institutes, the latter founded by Booker T. Washington, have caused the Negro to become better and better prepared for American life. Nevertheless, many Negroes feel that the legal doctrine of "separate but equal" opportunities in education has not always been satisfactory.

On May 17, 1954, the principle of segregation in public schools was declared unconstitutional by the United States Supreme Court. Racial integration in schools was opposed by many residents of southern states.

Despite their problems, Negroes have fitted well into American life. In the field of the arts, they have contributed much to the culture of America, particularly in music.

The blues, as a type of music, are similar to the old Negro spirituals in that they help to dispel melancholy feelings. Modern American music has been profoundly affected by Negro blues since World War I. The spirituals and blues are entirely different from anything else found in music. Negro men of letters include Countee Cullen, Paul Laurence Dunbar, and Frank Yerby. There have been many contributions by such writers to the wealth of American literature. Other Negro writers and scholars include Dr. William E. B. DuBois and the only Negro Pulitzer prize-winner, Gwendolyn Brooks.

There have been many Negro scientists and inventors. George Washington Carver, world-famous crop and soil chemist, is only one. Jan Maezlinger invented the lasting machine for use in mass production of shoes. Percy Julian developed a method of producing the drug cortisone. He, also, worked on soya bean products to find medicinal helps for arthritis. Charles Drew perfected the blood bank.

Negroes who have excelled in sports include Jessie Owens, Olympic star, and Althea Gibson, first Negro to win the women's tennis championship at Wimbledon in England. Joe Louis is considered one of the greatest boxers of all time. When Jackie Robinson was signed by the Brooklyn Dodgers, he became the first Negro to play in organized baseball.

There are more Negroes in Georgia and in North Carolina than in any other state. Each has more than a million and there are many states with half a million. Some Northern cities have large Negro populations. About 10 per cent of the population for the entire country is Negro.

It can be said that the Negro is becoming more and more successful in his efforts to adjust to life in the United States.

NEHEMI'AH. A famous Hebrew whose activities as governor of Judea are recounted in the Old Testament was Nehemiah. He was born in captivity and was made cupbearer to the Persian king, Artaxerxes. Artaxerxes sent him to Judea as governor in 445 B. C., with orders to rebuild the walls of Jerusalem. Nehemiah's administration was marked by prosperity and the institution of beneficial reforms.

NEHRU, *na' roo,* JAWAHARLAL (1889-). Hindu nationalist leader and first Prime Minister of the independent nation of India, Nehru was born in Allahabad and educated in England. After graduating from Cambridge University, he returned to India to practice law but soon devoted all his energy to the struggle for Indian independence. In this long fight, he worked with Gandhi, most famous of all Indian leaders. Nehru won great popularity. He was President of the Indian National Congress four times and its Secretary-General for many years. His political agitation resulted in long terms of imprisonment, but he refused to give up.

Nehru accepted the post of Vice-Premier for the interim government set up in 1946. In 1947 he reluctantly accepted the partition plan which created the separate nations of Hindu India and Moslem Pakistan. He became Prime Minister of independent India in the same year. In the struggle between the free world and the Communist world, Nehru sought to keep India in a middle position, working for peace.

NELSON, HORATIO, Viscount (1758-1805). Hero of the Battle of Trafalgar, greatest sea battle of the Napoleonic Wars, Horatio Nelson has gone down in history as England's most beloved admiral. He became a midshipman when he was twelve years old, spending the rest of his life on the sea. When England declared war on the French Republic, he commanded a vessel in the Mediterranean and took part in several sieges, losing his right arm and the sight of one eye. After the Battle of Cape Saint Vincent, he was promoted to rear admiral. In 1798 he went to Egypt, where he destroyed Napoleon's fleet in the Battle of the Nile and became known throughout the world.

In 1801 he became vice admiral and was responsible for the defeat of the Danes in the Battle of Copenhagen. It was at this time that he was created a viscount.

In 1803 the war with France was resumed, and Nelson became commander in chief of the Mediterranean fleet, with the *Victory* as his flagship. He blockaded the French fleet at Toulon, but two years later the French evaded the blockade. Nelson pursued the French ships, and finally, off Cape Trafalgar on the southwest coast of Spain, he engaged them in battle. Spain came to the aid of the French, but the English were too powerful. They captured twenty enemy ships and put an end to Napoleon's plan to invade England.

Nelson, who had inspired his men with the famous signal, "England expects every man to do his duty," at the beginning of the battle, was never again to see his native land, for he received a fatal wound in the battle. His body was returned to England in state, and, while the entire nation mourned, it was placed in St. Paul's Cathedral, London.

NEMEAN, *ne'me an,* **GAMES.** Every two years in ancient Greece, athletes from each of the city states gathered in Nemea, a valley in the Peloponnesus, to compete in athletic contests. These were the Nemean Games, one of the four great competitions held by the Greeks, the others being the Olympic, Isthmian, and Pythian. The poet Pindar wrote eleven odes to commemorate the Nemean Games.

NE'ON. One of the rare gases, the element neon forms but fifteen parts in every million parts of the atmosphere. It is colorless, odorless, and tasteless, does not combine with other elements, and is difficult to condense.

Neon is a conductor of electricity; sealed in tubes, it produces a bright, reddish glow when an electric current is passed through it. Neon tubes are much used in advertising signs and airplane beacons. The symbol of neon is *Ne*.

NEPAL, *ne pawl′.* Lying on one of the highest slopes of the Himalaya Mountains to the north of India is the independent kingdom of Nepal. Although it has complete control of its own internal and foreign affairs, it maintains close relations with the British and Indian governments. It covers an area of about 54,000 square miles and has a population of about 8,600,000.

Within the northern borders of Nepal are some of the highest peaks of the Himalayas. These highlands give way toward the south to rich and fertile plains, producing grain, rice, tobacco, cotton, and sugar cane. Cattle raising is very general. The mountains in the north are covered with dense forests, and the country has important mineral resources, although they have not been well developed. Steel and copper manufacturing is carried on to some extent. The people are chiefly of Mongolian origin. There are several schools in Nepal, and a good college is maintained at Katmandu, the capital.

NEP′TUNE. Next to Jupiter, his brother, the most powerful deity in classic mythology was the god of the sea, called Neptune by the Romans and Poseidon by the Greeks. Several times the sea god sought to gain more power. At one time he tried to take Jupiter's domain for his kingdom, and Jupiter punished him by forcing him to serve under the Trojan king, Laomedon. With Apollo, Neptune built the walls of the city for the king, but when Laomedon refused to reward the gods, Neptune created a horrible sea monster that demanded the sacrifice of a beautiful maiden each year.

Another legend tells how the sea god had a contest with Athena (Minerva) to see who should name the great city of Greece. Each was to create a gift. Neptune submitted a horse, but Athena's olive tree won, and the town was named Athens in her honor (see ATHENS). Neptune usually was pictured as middle-aged and wearing a long beard, but he was never quite so dignified as Jupiter. According to the ancient stories, he rode a brilliant chariot drawn by sea horses, and in his hand he carried a three-pronged spear, or trident.

NEPTUNE. Eighth planet from the sun in the solar system, Neptune was discovered under most interesting circumstances.

Uranus had been discovered in 1781, but Neptune was so extremely far away that it escaped detection until sixty years later. However, during that period, astronomers found that Uranus did not reach the place in its orbit which they had predicted for it. As an explanation of the irregularity of Uranus, it was suggested that there might be another planet whose attraction caused the discrepancy.

Two young astronomers, an Englishman and a Frenchman, worked on the problem in 1845-46, and without ever having seen the planet or in any other way knowing it was there, determined the position of the body which was affecting Uranus. Acting according to their directions, astronomers found the planet Neptune very near the place calculated by the brilliant young scientists.

Neptune is so far away that it is visible only with a telescope. Actually, it has a diameter of about 31,000 miles. Although light travels 186,300 miles in a second it takes four hours for its rays to reach the earth from Neptune. Among the planets, only Pluto, discovered in 1930, is farther away than Neptune. The mean distance of Neptune from the sun is 2,791,000,000 miles. Its period of revolution about the sun, or its *year,* is equal to 164 2/3 of our years. Its rotation period is equal to 15.8 hours as we reckon time. Neptune has two satellites, one the size of our moon and one fifteen times smaller.

NERO (37-68). Murder, poison, violence, and disgrace marked the entire career of Nero, a Roman emperor whose life was an example of the decadence of Roman aristocracy. Son of Cneius Domitius Ahenobarbus, he was adopted when a child by his mother's second husband, the Emperor Claudius. In the year 54,

CRUELTY OF AN IMPERIAL TYRANT
Nero rebuilt the city of Rome on a magnificent scale, but he was a cruel and vicious emperor, and recklessly extravagant. Here he is watching tortured Christians.

Nero's mother, Agrippina, poisoned her husband and placed Nero on the throne, although Claudius' son, Britannicus, was the rightful heir. The next year Nero poisoned Britannicus, and, several years later, even had his mother murdered. He followed this atrocious act by having his wife, Octavia, put to death.

Nero paid little attention to the affairs of state, despite the fact that thousands of Romans were going hungry in the streets and that wars raged in the provinces. Instead, he gave himself to pleasure and vice, and when Rome was set on fire, in July, 64, he was charged with the crime. To distract attention from himself, he persecuted the Christians, but other Romans were not deceived. They conspired against him for his unjust taxation, cruelties, and wholesale executions. Nero even had Seneca and Lucan killed. At last, Nero was declared to be an enemy of the empire by the Senate, but before he was arrested, he killed himself with a dagger.

NERVES, *nurvz.* The slender cords which extend in a network throughout the body and make up the nervous system are nerves. The two centers in which the nerves originate are the brain and the spinal cord. From the nerve centers the nerves go to the various organs of the body and to all the muscles; they even go to all parts of the skin. Their function is to carry messages both to and from the centers; and for this reason the nerves are paired—a motor and a sensory nerve going together. Motor, or *efferent,* nerves carry messages from the nerve centers; sensory, or *afferent,* nerves carry messages to the nerve centers.

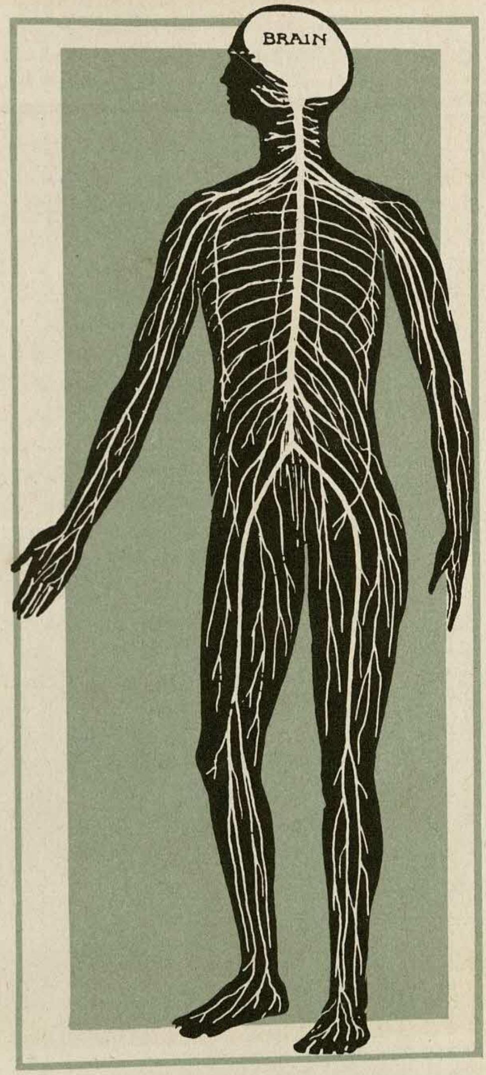
Structure. Nerves are not single structures but are bundles of nerve fibers held together with connective tissue, and are more properly called nerve trunks. The nerve fibers are extensions of the neurons, or nerve cells, which give rise to outgrowths called *dendrites* (which are short threads, or branches) and *axones* (which are long threads). Nerves, like the brain, are composed of gray matter and white matter, but in the nerves the gray matter is on the inside and the white matter forms an outside covering; this arrangement is reversed in the brain.

Cranial Nerves. The twelve pairs of nerves which radiate, or spread out, from the brain are called cranial nerves. Nearly all of them come from the underside of the brain, the medulla oblongata. The cranial nerves are concerned with sight, smell, hearing, taste, and certain other functions of the head, the face, and the upper part of the body.

Spinal Nerves. Thirty-one pairs of nerves radiate from the spinal cord, which extends down the back from the brain. These nerves spread out into many branches to all parts of the body. See NERVOUS SYSTEM.

NERVOUS SYSTEM The vast network which co-ordinates the actions, sensations, and functions of the body is the nervous system. It is composed of the brain, the spinal cord, and all the nerves. The nervous system has two subdivisions—the cerebrospinal, or central, and the sympathetic, or autonomic, systems.

Cerebrospinal System. The brain, the spinal cord, and the nerves branching off from them compose the cerebrospinal system. The cranial nerves and the spinal nerves carry impulses, or messages, inward toward the center from various parts of the body, and carry other impulses from the center outward to various parts (see NERVES). The nerve trunks are in two parts—posterior and anterior—which, after leaving the spinal cord, join and form a ganglion. From each ganglion nerves spread throughout the body.



HUMAN TELEGRAPH SYSTEM
A view of man's nervous system, showing the brain, the spinal cord, and branching nerves.

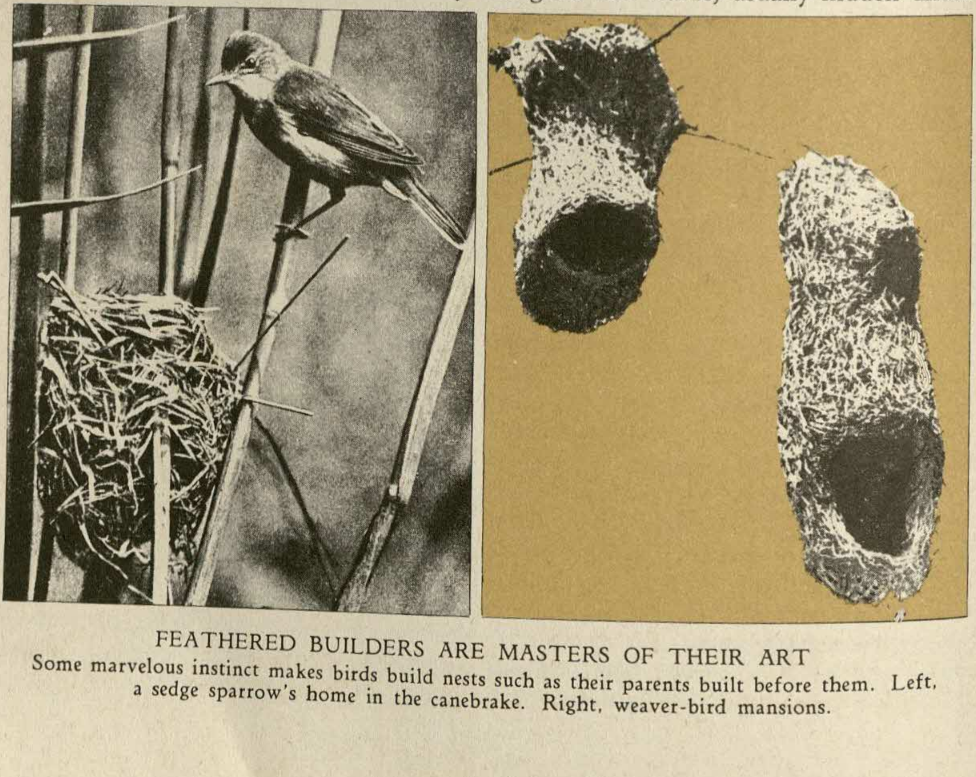
The posterior roots, those which originate in the back of the spinal cord, are sensory nerves. The anterior, those which originate in the front of the spinal cord, are motor nerves. The spinal nerves branch out and divide into smaller branches, forming networks, or plexuses, of nerve fibers, until finally they form a complete network in the skin.

Sympathetic System. The sympathetic system lies along the forward (anterior) side of the vertebrae. It consists mainly of two chains of nerves and ganglia, or small groups of nerve cells, connected with one another and with the spinal cord by means of branches to the spinal nerves; in a similar manner they are connected with the brain by branches to the cranial nerves. From these ganglia and the cords uniting them, branches go to the organs of the chest and abdomen, including the blood vessels. Thus there is a connection between every part of the body and the cerebrospinal center.

The principal duty of the sympathetic system is to control the parts of the body which are not under voluntary control. For example, sympathetic nerves direct the muscles which control the pupil of the eye. They control such important bodily functions as circulation, digestion, secretion, and excretion.

NEST. Most birds do not build a nest as a home, but rather as a place to lay their eggs and rear their young. As a matter of fact, nests are usually built only large enough to allow the female to sit upon the eggs, and the male bird roosts upon near-by branches. Although most birds build some sort of nest, a few, like the American cowbirds, lay their eggs in the nests of some other birds and leave the hatching to the foster parents. Quite often, the owner will resent this intrusion and will abandon its own nest and eggs and build a new one elsewhere.

Peculiar Ground Nests. A few species of ground-nesting birds refuse to build nests, but lay their eggs in a small hole in the sand or on the bare rocks. Meadow larks and quails build well-concealed nests of grass and leaves, usually hidden under



FEATHERED BUILDERS ARE MASTERS OF THEIR ART

Some marvelous instinct makes birds build nests such as their parents built before them. Left, a sedge sparrow's home in the canebrake. Right, weaver-bird mansions.

bushes or hedges. Although some ground nests are mere piles of twigs, others are often carefully lined with down picked from the parents' bodies. The mound birds build nests of decaying vegetable matter, and the heat from this material hatches the young birds.

Kingfishers and sand martins dig small caves into the bank of a stream and lay their eggs at the ends of these burrows. Some of these caves are elaborately built and may turn to right or left. In the Western states, the burrowing owl often uses the abandoned home of a prairie-dog family instead of digging its own burrow.

Varieties of Tree Nests. The average tree bird selects a well-forked limb and wedges its nest tightly into this cleft. Robins and some other birds usually lay a foundation of clay, finishing it with a collection of feathers, twigs, and straw. The woodpecker drills its home into a hollow tree and lines it with grass and straw. One of the most interesting nests is that of the Baltimore oriole, a sacklike construction that swings freely from a tree limb.

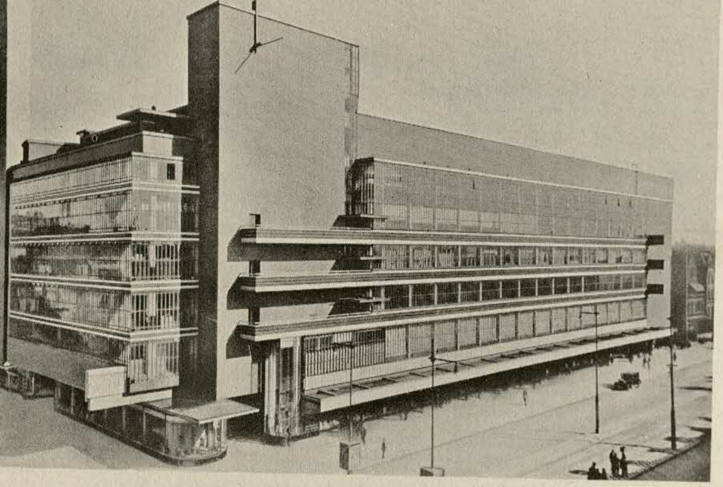
Other Nests. The chimney swift does not live in trees, but builds a nest of clay in a chimney. The weaver bird builds a bottle-shaped nest with the opening below and the nest itself located on the inside of the "bottle." In building its nest, the tailor bird sews the grass and leaves together. In Holland, the storks build great, flat nests of twigs atop chimneys; and no one dares disturb them, for these birds protect the dikes by digging in them for crawfish and other burrowing crustaceans. In China, a rare delicacy is bird's-nest soup, made from the nest of one of the swifts. See BIRDS.

Netherlands Information Service

A Little Kingdom that Defies the Sea

NETH'ERLANDS, THE, **or HOL'LAND.** Most of the leading nations of the world have achieved their power and influence largely because they have rich natural resources and wide areas of fertile land. This is not the situation, however, in the case of the Netherlands.

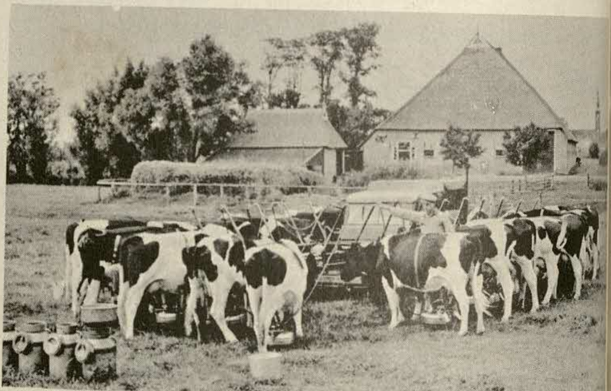
It has been said that "God made the world, but the Dutch made Holland." Truly this little country has been made by man, for its history tells the story of a constant battle with the sea, always threatening to inundate the land. The famous dikes and the picturesque windmills have



Netherlands Information Service

ROTTERDAM SHOWCASE

Shown at left is the ultramodern, glass-walled Bijenkorf department store on the Coolsingel in Rotterdam. The well-lighted structure was badly damaged by German bombs in May, 1940, but was later rebuilt. Rotterdam is Europe's largest port, and an important trading and shipbuilding center. The city is also a favorite of art-lovers.



HOLLAND MILKING CIRCLE

Holstein-Friesian cows line up for their daily milking in Friesland province, famous for its milk production. Power for milkers is supplied by truck's motor. The Netherlands annually produces about fourteen billion pounds of milk, about one-sixth of which is used in liquid form. The country ranks ninth in butter production, fourth in cheese output.

been the weapons that the sturdy Dutch have used for hundreds of years to keep back the waters of the North Sea. Holland has no great natural wealth, except the rich alluvial soil left in the wake of the floods. The third great problem is the small size of the country, which has an area of only 12,868 square miles, about that of the state of Maryland. Yet, in spite of these handicaps, the Netherlands is normally one of the leading commercial nations in the value of its trade.

Physical Features. The northern and western limits of the Netherlands are washed by the North Sea; Germany lies on the east and Belgium on the south. Holland is almost entirely a lowland country, with much of the area below sea level and no elevated sections except in the southeast. The interior is flat, broken only by swamps and lakes which are constantly being drained, the land thus reclaimed being turned over to farming. Dotting the countryside are the famous windmills which pump the water from the marshy areas.

The coast line is very irregular and is broken by many indentations, the largest of which is the Zuider Zee, a long arm of the North Sea. The Zuider Zee was once a lake lying within a densely forested region. The lake gradually overflowed and covered a large part of the surrounding country. In the thirteenth century the North Sea swept over the area, joining the waters of the lake and thus forming a great arm of the sea. A large dike was built at the mouth of the Zuider Zee, which is now called Ijssel Lake. A great draining project was undertaken to reclaim over 500,000 acres of the land under the Zuider Zee. In the final days of World War II the Germans flooded it to halt the Allied advance, but it was reclaimed after the war.

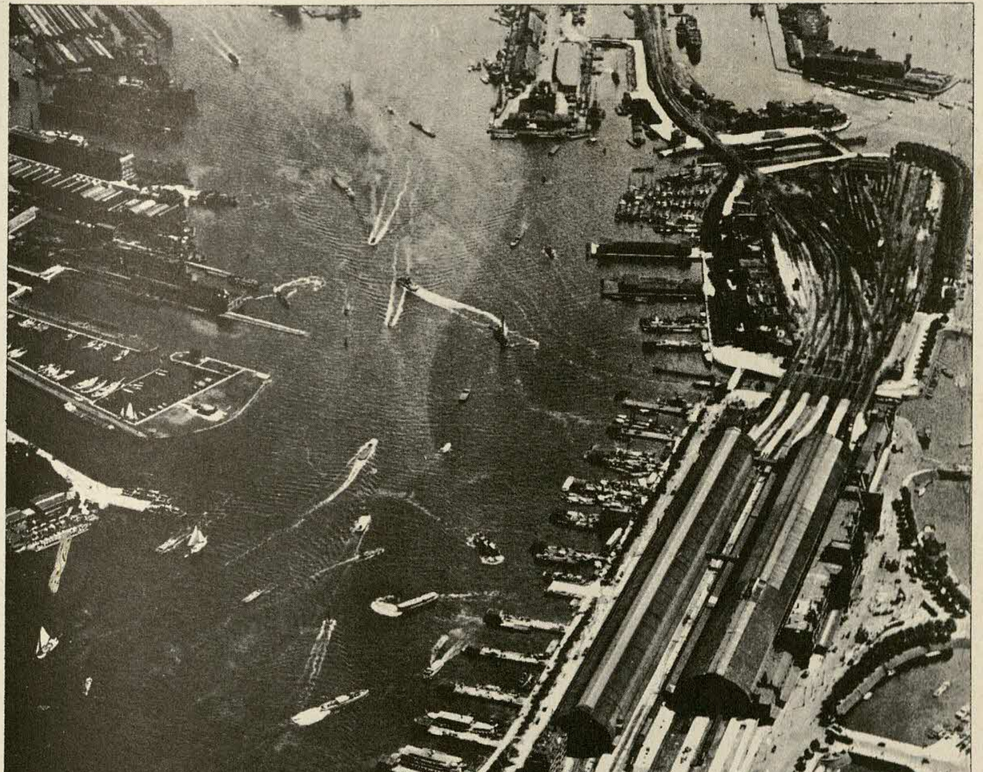
The Netherlands is a low, wet country

because it is composed chiefly of the deltas of the Rhine, the Meuse, and the Scheldt rivers. These rivers and the Ijssel are the principal rivers of the country. Off the coast are a number of small islands.

Climate. As is to be expected in such a low, wet country, the climate is cloudy and damp most of the time. The land is constantly swept by strong north and west winds, which blow in heavy fogs from the sea. The sun shines only about forty days of the year. There are no extremes of temperature, the average for the year being about 49°F. The rainfall averages about thirty inches.

Natural Resources. The only minerals of any value are the coal deposits in Limberg, and the plentiful peat supplies. There are a few forest areas, but they are of little importance. The country does have, however, rich farm and pasture lands. Among the leading natural resources are the herring and oyster fisheries of the North Sea. The chief advantage of the Netherlands is its position on the North Sea, literally in the center of world trade.

Farming and Manufacturing. Because of the small area of the Netherlands, the agricultural land is divided up into small units, for the most part, and intensive farming is practiced. However, the soil devoted to agriculture is rich and produces large crops. The richest farming region lies in the provinces of Zeeland and Groningen. The chief crops are rye, oats, wheat, barley, sugar beets, beans and peas, flax, caraway seeds, and potatoes. With a large



COMMERCE COMES TO AMSTERDAM FROM THE SEVEN SEAS

One of the busiest of the world's ports, Amsterdam's harbor is alive with the water-borne traffic of the city's great import and export trade. The islands are made land.

population and small farm areas, the Netherlands must import large quantities of foodstuffs.

Many small land plots are devoted to truck gardening and floriculture, the products of which find a ready market in the near-by cities. The country is noted for its flowers, particularly tulips and hyacinths, the bulbs of which are exported in large quantities. The livestock industry is very important, especially the raising of dairy cattle. The products of the dairy industry are also valuable export items.

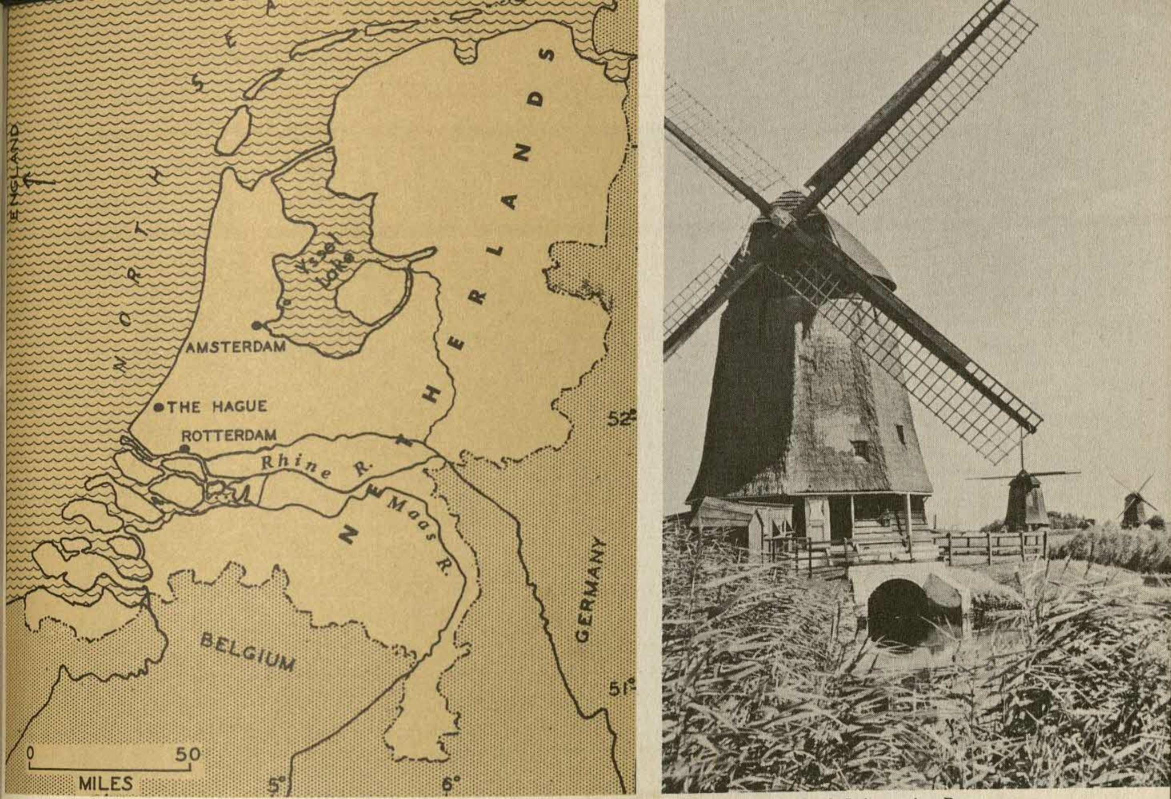
Skillful use of imported raw materials has built a vigorous manufacturing industry. More than half of Holland's industrial workers are employed in making metals, foodstuffs, and textiles. The Netherlands' large shipbuilding industry furnishes it with one of the world's great merchant fleets, as well as building foreign vessels. Holland also has sizeable clothing, earthenware, and chemical industries. It is famous for such products as cocoa and chocolate, gin, cut diamonds, glassware, and smoking pipes. Its principal mineral products are coal, petroleum, and salt.

Trade and Colonies. The Netherlands became one of the leading commercial nations in the world for two reasons. First, the country lies chiefly on the delta of the Rhine, which is one of the great commercial waterways of Europe. Rotterdam is on the banks of one of the branches of this stream. The country is also connected with the interior of Europe by several canals, over which in normal times freight is carried to the coast. Secondly, the country lies in the center of world trade, and most of the goods of the East Indies are shipped to Rotterdam and Amsterdam, the two leading ports. Next to England, Holland is the greatest market for East Indian goods. Normally, the chief exports of the Netherlands are butter, cheese, condensed milk, flower bulbs, skins, and seeds. Under the Benelux Customs Union agreement, trade between the Netherlands, Belgium, and Luxembourg is free of customs duties. Holland lost its richest colony in 1949, when the Netherlands Indies became the United States of Indonesia. Remaining colonies are Surinam, Netherlands Antilles, and Dutch Giuana.

The People and Their Institutions. The people of the Netherlands belong to the Teutonic race and are closely related to the Germans. They are thrifty, hardworking people whose skill and ambition have made Holland a great country. Although freedom of worship is allowed, the majority of the people are Protestants, principally of the Dutch Reformed Church. The country has a population of about 11,173,000. The leading cities are Amsterdam, Rotterdam, The Hague (the legislative capital), Utrecht, and Haarlem.

The Netherlands is a constitutional and hereditary monarchy, headed at the present time by Queen Juliana. The queen is assisted by a State Council of ten members, called the *Raad van State,* which she appoints. This council handles some of the executive work and advises the queen on important matters. In addition there is a Council of Ministers, or a cabinet. The States-General, the legislative body, is composed of two chambers: the First Chamber, called the *Eerste Kamer;* and the Second Chamber, called the *Tweede Kamer.* The First Chamber is composed of fifty members elected by the Provincial States. There are 100 members of the Second Chamber, elected by popular vote. Bills originate in this latter house.

History. When the Roman forces led by Julius Caesar invaded Gaul, they found the territory of the Netherlands held by warlike Germanic tribes north of the Rhine and by the Celts south of the river. The Romans, unsuccessful against the Germanic peoples, subdued the Celts and made their country a province of Rome. The Franks crossed the Rhine in the fifth century and captured the Roman provinces except for a small part in the north held by the Saxons and Frisians. It remained for Charlemagne to unite the entire territory under his empire and to convert the people to Christianity. With Charle-



Netherlands Information Bureau

THE NETHERLANDS RECLAIMS LAND FROM THE SEA

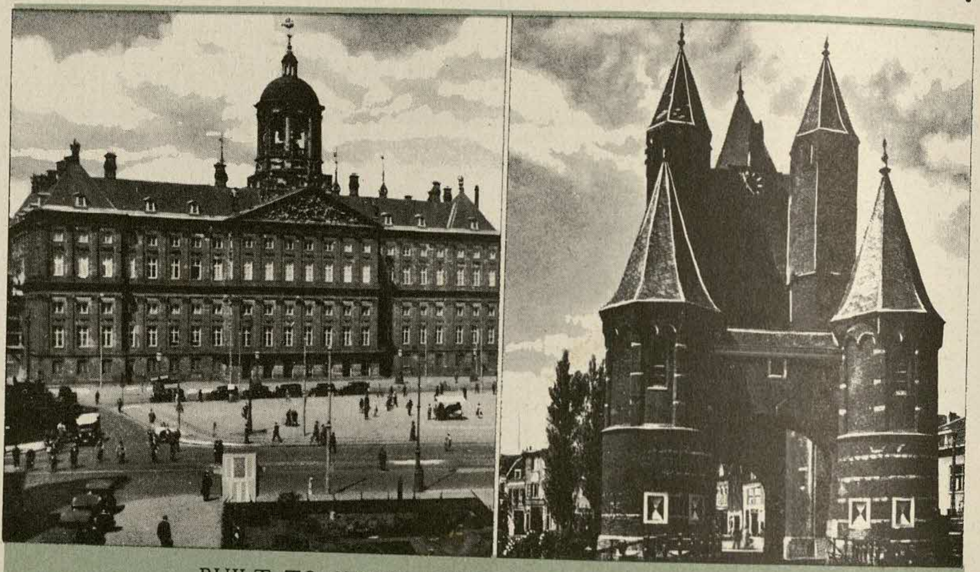
Left, outline map of the Netherlands shows how Yssel Lake, once part of the Zuider Zee, was cut off from the North Sea by a great dike. Nearly 500 square miles of land have been reclaimed from the lake. Right, windmills, once used for pumping, are fast disappearing.

magne's death, the Netherlands was divided among Germany, France, and Lotharingia.

With the development of cities in the thirteenth century, Ghent, Bruges, and Antwerp became centers of world trade. Until the fourteenth century, most of the territory of the Netherlands was held by feudal lords, but gradually they began to lose their power. Finally they were so weakened that the Duke of Burgundy was able to gain control of the entire country. In 1477 the land came under the control of the Hapsburgs by reason of the marriage of Mary of Burgundy and Maximilian of Austria. A few years later the country became united under the Spanish Hapsburg king.

The Spanish rule became more and more harsh. The Netherlands was strongly Protestant; Spain was largely Catholic. Continual dissatisfaction grew into an open revolt under the leadership of William of Orange. This revolt marked the beginning of a long, fiercely fought war. The Spanish forces at first succeeded in putting down the rebellion, but in 1576 the northern and southern provinces formed an alliance known as the Pacification of Ghent. This alliance, however, was broken up by the Spanish viceroy, Alexander Farnese, who succeeded in getting the southern provinces to return to Spain. By the Union of Utrecht in 1579, however, the northern provinces were united as the modern Netherlands.

The bitter struggle continued, and William of Orange was assassinated in 1584. The Peace of Antwerp in 1609 brought a truce with Spain, but it was not until 1648, at the end of the Thirty Years' War, that the independence of the united northern provinces was fully recognized. Thereafter, the Netherlands had a period of



BUILT TO STAND THROUGH THE CENTURIES

Since much of the Netherlands has been reclaimed from swampland, many buildings, like the Amsterdam Palace (left), are built on piling. Right, an old gate in Haarlem.

great progress and development and became the leading maritime and commercial nation in the world.

In the meantime, the southern provinces remained under the control of Spain and later Austria. Austria dominated the Netherlands until 1797, when they passed under the influence of France. Napoleon gave the Kingdom of the Netherlands to his brother Louis in 1806, and four years later the country became a part of France. With the fall of Napoleon, Belgium and the Netherlands were united under William I. In 1830, however, the Belgians revolted and set up a separate kingdom with their independence guaranteed by the leading powers of Europe.

Under the rule of William II, William III, and Queen Wilhelmina, the country enjoyed steady progress until war engulfed Europe in 1939. Although the Netherlands made every possible effort to remain out of the war, the Germans invaded the small nation on May 10, 1940. Holland was entirely overrun in less than a week, although the Dutch army fought desperately to check the invasion. Queen Wilhelmina and her Cabinet fled to London, from which the Netherlands government ruled in exile until the liberation of Holland in 1945. On Sept. 4, 1948, Queen Wilhelmina abdicated, and two days later her daughter, Juliana, was crowned queen of the Netherlands.

For additional information, consult:

Amsterdam
Borneo
Celebes
Dutch East Indies
Hague, The
Hitler, Adolf
Java
Philip II (Spain)
Surinam
William I
(Prince of Orange)
William III
World War II
Zuider Zee

NETHERLANDS EAST INDIES. See Dutch East Indies.

NETTLE. Native to Europe but scattered widely in America are the nettles, plants having a covering of fine, stinging hairs. The fiber of some species is used to make rope, yarn, tent cloth, and other coarse fabric. When dried, the plants make excellent fodder, and the young shoots may be eaten like spinach. Nettles are also the source of dyes.

NEUTRALITY. Just as *neutral* means "of no particular color," so *neutrality* may be defined as "the state of being of no particular color." It is a term which in-

international law describes the position of a disinterested, noncombatant nation in respect to other nations which are at war, or to the factions within a single nation which may be engaged in civil war. Theoretically, it means that the neutral nation has no interest in which side may be victorious, but in behalf of its own government and people, it maintains that the belligerents shall recognize its right to carry on normal and legitimate activities everywhere, including commerce with the belligerents themselves.

From time to time, efforts have been made to arrive at an international code governing the problems of neutrality and neutral rights. Notable steps in this direction were the Declaration of Paris in 1856. two conventions drawn up at the second Hague Peace Conference in 1907, and the Declaration of London in 1909. Tied up with the question of neutral rights is the whole matter of freedom of the seas in time of war.

In the past it has been found that insistence upon the right of freedom of the seas and of trade with belligerents tends to force the neutral nation into war. In the United States there has been strong sentiment for a policy which would restrain its citizens from insisting upon these internationally recognized rights. It was crystallized in a joint resolution passed by Congress on August 31, 1935, prohibiting the export of "arms, ammunition, or implements of war" to any port of a belligerent state "upon the outbreak or during the progress of war between, or among, two or more foreign states." The President was to issue a proclamation when he felt that such a state of war existed, and was also by proclamation to "enumerate the arms, ammunition, or implements of war, the export of which is prohibited by this act." Penalties were imposed for violation of the prohibitions.

An amendment to the act, passed in 1936, forbade citizens to purchase, sell, or exchange bonds, securities, or other obligations of the government of any belligerent country, and extended the act to May 1, 1937. Another group of amendments was adopted by Congress on April 30, 1937, and proclaimed by the President on May 1. The new legislation extended the provisions of the original act to countries engaged in civil strife, if the President should find that the civil strife was of such character as to make the action desirable in the interest of the peace of the United States. The law also authorized the President to put into effect a cash-and-carry plan, whereby he was given power to require that title to cargoes bought in the United States must pass to the consignees and that such cargoes must be carried in foreign ships.

After the outbreak of war in Europe, in 1939, President Roosevelt called a special session of Congress to enact neutrality legislation designed to cover new conditions. The Neutrality Act and accompanying proclamations went into effect on November 4. The act repealed the provisions of the old law forbidding the shipment of war materials and implements of war to belligerents; provided for a severe cash-and-carry policy; and authorized the President to proclaim zones which would be closed to American ships. The act was partly repealed in 1941, and became inoperative when the country entered the war.

NE'VA. One of the shortest rivers in Europe, the Neva is, nevertheless, one of the most important commercially. It carries the waters of Lake Ladoga and a number of smaller bodies in Northwestern Russia into the Gulf of Finland. Along its shallow course of forty miles large dams and water-power plants have been built, and much money has been spent in improving navigation. The Neva has built up a long delta on which, about ten miles from the gulf, is the city of Leningrad. A large traffic in grain and manufactured goods moves on the Neva and the long canals that connect it with the Volga River.

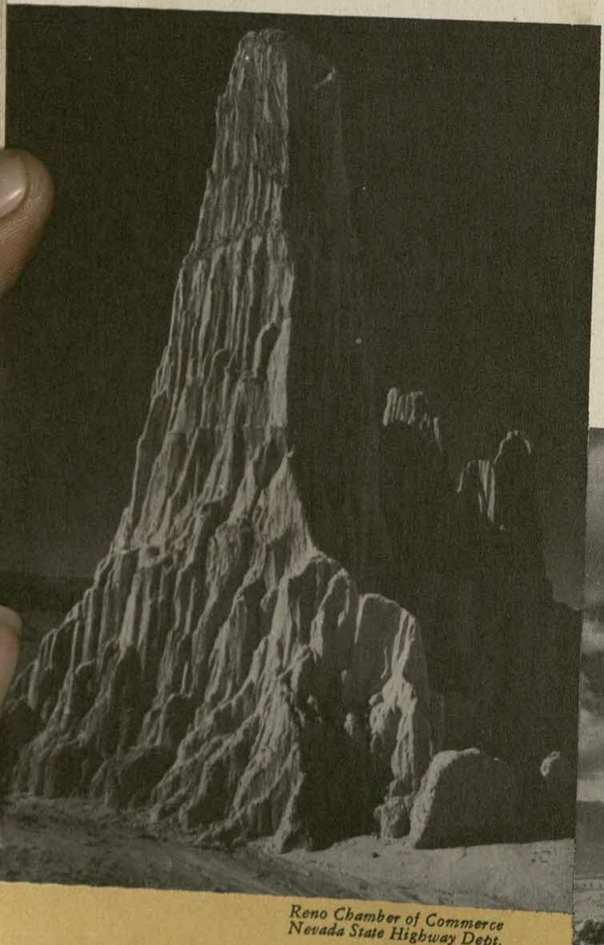
NEVAD'A. Lying on the western edge of the vast plateau between the snow-covered Sierra Nevadas and the towering Rockies is wedge-shaped Nevada, "the

Sagebrush State," so-called because of its vast areas of parched, brush-covered desert. Oregon and Idaho bound it on the north, Utah and Arizona on the east, and California on the south and west. With an area of 110,540 square miles, it is the seventh largest state in the Union. But it is the least populous state, with a density of only 2.6 persons to the square mile, for the state's total population is about 284,000; many cities in the United States have larger populations. Nevada is also noted as being the driest state, with an annual rainfall of less than ten inches. It is, however, rich in mineral resources.

The Land. All but the southern part of the state is a plateau, part of which in ancient times was the bed of a sea. The elevation ranges from 2,000 to 6,000 feet above sea level. A large part of the area is occupied by north-south mountains, some of which rise as high as 12,000 feet. They are separated by long, narrow valleys. The northeastern part of the state slopes to the Columbia River Valley; the southern part drains to the Colorado basin.

Between these regions is an area known as the Great Basin, in which are located the few rivers of the state. Most of these flow into inland lakes and sinks. The largest stream is the Humboldt, which flows into Humboldt Lake. The Owyhee River flows northward into the Snake River and thence into the Columbia. The Colorado River forms part of the southeastern boundary. Many of the rivers rise in the mountains, and the swiftness of their currents makes them valuable for the generation of hydroelectric power.

Climate. The climate is mild and dry and there is abundant sunshine. The summers are hot in daytime, but, because of the low humidity, become cool at night. The climate is varied, owing to the great length north and south and extremes of elevation. Southern Nevada has no winter. The slight rainfall occurs chiefly in late winter and early spring, with the result that

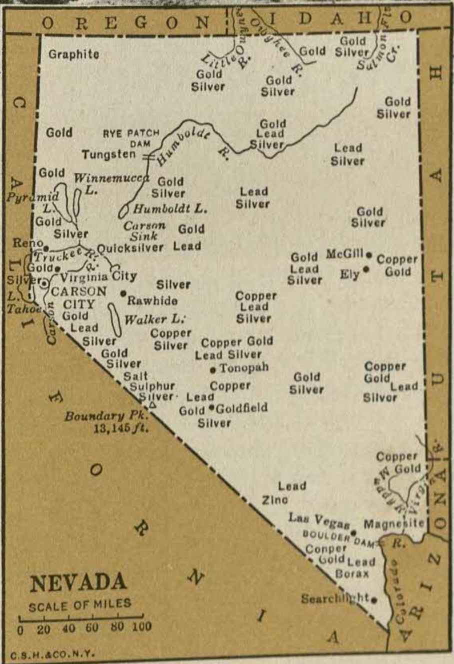


Reno Chamber of Commerce
Nevada State Highway Dept.

IN THE SILVER STATE

There are large farms in irrigated sections of Nevada: the average size is nearly 1,000 acres. Above, The Cathedral Spire. Right, haying on a ranch near Reno.

HOME ON THE RANGE
Livestock raising is the principal agricultural business of Nevada; above, a herd of about 500 range cattle en route to the railhead.



irrigation is necessary in order to grow crops.

Natural Resources. Nevada contains deposits of almost every known mineral, and the mines produce most of its wealth. The richest deposits are silver and gold. The most famous mine is the Comstock Lode, which has produced about $600,000,000 worth of gold since 1859, when it was first opened. Numerous rich mines that were discovered years ago have long since been exhausted, but there are still enough deposits to give the state a steady output of gold and silver. The other important minerals are copper, lead, zinc, quicksilver, gypsum, and tungsten. There have been found large quantities of borax, soda, potash, and salt. In addition there is some building stone and coal.

There are more than 5,700,000 acres of forests in the mountain regions, of which over 5,300,000 are national-forest areas.

Farming Without Rain. Out of an arid desert the farmers of Nevada have made productive farms by the magic of irrigation. There are more than 3,000 miles of irrigation ditches in the state, which provide water for most of the farm lands. In addition to the ditches, artesian wells and great reservoirs are used to water the land. The principal crops include wheat, oats, barley, potatoes, and a variety of fruits, including apples, pears, and cherries. The raising of livestock is important in those regions where prairie grass is abundant.

Manufacturing and Transportation. Manufacturing is not of great importance in Nevada. The chief manufacturing industry is the smelting of copper, followed by the preparation of other ores and the making of mining machinery. There is a growing production of railway cars, lumber, flour, beet sugar, and gypsum.

AN EMPIRE OF MINERALS
Called the greatest man-made hole in the world, this copper pit at Ruth yields rich ore.

Included in the 2,500 miles of railroads in Nevada are several transcontinental trunk lines that cross the state. There are also about 5,000 miles of state highways. There is little or no water transportation.

Government and Education. The governor and other state officers are elected for four-year terms. The legislature, consisting of two houses, meets every two years for sessions of sixty days. The members of the senate are elected for four years, and those of the lower house for two. Carson City is the capital.

The educational system of Nevada has had to provide schooling for a widely scattered population. However, this task has been successfully accomplished through a progressive system. A state board and superintendent supervise the schools. School attendance is compulsory for children from seven to eighteen years of age. The University of Nevada, including the Mackay School of Mines, is located at Reno.

History. The Spaniards first explored Nevada in 1775. However, little was known about the territory until it was acquired by the United States in 1848 as a result of the Mexican War. In that year, when gold was discovered in California, many fortune hunters crossed Nevada. The discovery of the famous Comstock Lode in 1859 and of other mines soon afterward brought thousands of gold seekers to Nevada. The territory was at this time a part of Utah, but it became a separate territory in 1861. It was admitted to the Union in 1864 as a state. See CARSON CITY.

NEW'ARK, N. J. With its tall buildings and factories rising high above the low lands that surround Newark Bay on the Passaic River, Newark is situated only eight miles from New York City; and although it lies within a different state, of which it is the largest city, it is really an extension of the manufacturing districts of New York. It is one of the great Atlantic seaports, and along its water front are numerous docks and wharves that handle millions of tons of ocean freight.

The Newark Airport, 2,300 acres, is one of the largest and busiest in the United States. The airport and seaport are operated by the Port of New York Authority, an agency of the states of New York and New Jersey. Railway and subway tunnels link Newark to lower New York. Automobiles make the trip by way of the Lincoln and Holland tunnels.

Newark is New Jersey's leading manufacturing and trading center. Among the products of its factories are chemicals, electrical machinery, furniture, textiles, paints and varnishes, leather, cutlery, and jewelry.

Newark Colleges of Rutgers University, a branch of the state university, includes colleges of arts and science, business administration, law, and pharmacy. Other institutions are the Newark State College, the Newark College of Engineering, and divisions of Seton Hall University.

Among Newark's famous old buildings are Trinity Cathedral, the Old First Church, and the Newark Academy. There are also imposing civic buildings, an art museum, and a stadium.

Newark was established in 1666 by a group of Puritans from Connecticut, and it was incorporated as a city in 1836. It has a commission form of government. The city's population is about 400,000; the metropolitan area has a population of about 1,744,000.

NEW BRUNS'WICK. With excellent harbors, dense forests, and wide stretches of fertile soil, New Brunswick, the largest of the Maritime Provinces of Canada, has been richly endowed by Nature. It is the largest of the three eastern provinces, the others being Nova Scotia and Prince Edward Island. New Brunswick was largely settled by United Empire Loyalists, who emigrated to Canada at the close of the American Revolution. The province was at one time a part of British Acadia, immortalized in Longfellow's poem *Evangeline*.

Left, courtesy Canadian National Railways

A FOREST AND OCEAN PROVINCE

Interior New Brunswick is richly forested: its Atlantic position makes fishing important.

It has an area of 27,985 square miles and a population of about 575,000. It is separated from Nova Scotia on the south by the Bay of Fundy; to the east lies the Gulf of saint Lawrence; and on the north and west are the province of Quebec and the state of Maine.

Features of the Land. New Brunswick consists mainly of an undulating plain, no part of which is very high, although there are numerous hills and valleys. The coastal lands along the Gulf of Saint Lawrence are low and marshy, while those bordering the Bay of Fundy are high. A rise in the land that extends across the region forms a watershed that separates the rivers, some of which flow into the gulf and others into the bay.

The 600-mile coast line is very irregular, and there are many bays and inlets that form fine harbors. Several rivers cross the region, the largest being the Saint John, 450 miles in length, which drains the western part. This and the Petitcodiac River, both noted for their high tides, flow into the Bay of Fundy, as does also the Saint Croix River. The rivers that drain into the gulf are the Restigouche and the Miramichi.

Climate. The climate of New Brunswick is very healthful. While it is warm in summer and cold in winter, the extremes of heat and cold are not so great as those farther inland. The average annual rainfall is about forty inches, and the coastal regions are covered with fogs at certain times of the year.

Mining and Industry. The province has a number of minerals of economic importance, but they have not been fully developed. The value of the annual output of mines and quarries is about $2,000,000. Coal, gypsum, natural gas, petroleum, granite, sandstones for abrasives, clay products, limestone, sand, and gravel are the chief products.

The forests of the province are of great commercial value. In addition to the government timber lands, there are large areas of privately owned forests. The principal trees are spruce, white pine, balsam, fir, hemlock, cedar, birch, maple, ash, and beech. Supplying timber for about 200 sawmills and woodworking factories, and the manufacture of wood products, give employment to thousands. The making of wood pulp is of growing importance.

New Brunswick ranks next to British Columbia and Nova Scotia among the Canadian provinces in value of fisheries. From the waters of the Bay of Fundy and the Gulf of Saint Lawrence are taken large numbers of lobsters, cod, herring, halibut, salmon, smelt, and other fish. The revenue from the fisheries is between three and four million dollars a year.

Agriculture. Nearly half the total area of the province is suitable for farming. The lowlands and river valleys are particularly productive. The climate is also favorable to agriculture. Most of the farmers are engaged in mixed farming, growing such crops as hay, wheat, barley, oats, and potatoes, and raising dairy cattle and other kinds of livestock. Fruit growing is important in the valley regions.

Government and Education. At the head of the government of New Brunswick is a lieutenant-governor, who is appointed by the Governor-General of Canada for a term of five years. The lieutenant-governor is assisted by a cabinet of seven members. Legislation is carried on by an assembly composed of forty-eight members. The province is divided into counties, administered by boards. The capital is Fredericton.

A provincial superintendent administers the school system of New Brunswick. This system includes primary, secondary, and normal schools, and in all there is a uniform method of instruction. At the head of the system is the University of New Brunswick at Fredericton. There are also Mount Allison University and the University of Saint Joseph's College, private institutions.

History. The French were the first to explore and settle the region now included in the province. Champlain made a settlement as early as 1604. Nova Scotia, New Brunswick, and part of Maine were included in the old French colony of Acadia. In 1763, at the close of the French and Indian War, the region was definitely ceded to England, and in 1784 New Brunswick became a separate colony. The first assembly met in 1786, and in 1867 New Brunswick became a province of the Dominion of Canada.

NEW CALEDO'NIA. Lying off the east coast of Australia is a long, narrow, mountainous island known as New Caledonia, the largest of a group of islands that belong to France. It is noted for its beautiful, forest-clad mountains and numerous bays that are formed by the coral reefs that surround it. There are quantities of mineral wealth stored in the mountains, such as cobalt, chrome, iron, nickel, copper, gold, and lead. An extensive agricultural industry produces coffee, corn, copra, tobacco, cotton, and tropical fruits. The island has a population of about 63,000. The native Melanesians form the largest element in the population. The seat of government is Nouméa.

NEW ENGLAND CONFEDERATION. Long before the United States was founded, the Plymouth, Connecticut, Massachusetts Bay, and New Haven colonies formed a confederation called the United Colonies of New England. This was the first attempt in America to unite a group of colonies based on representation in a common council. It existed from 1643 until 1684 for protection against any tribes or colonists that might tend to harm the various settlements. It began its existence as a strong confederation, but jealousy and compromise weakened it, and it finally broke up.

NEWFOUNDLAND. Off the northeast coast of North America at the eastern end of the Gulf of Saint Lawrence is the rugged island of Newfoundland. With its mainland dependency, Labrador, it forms a province in the Dominion of Canada. Having an area of 42,734 square miles, Newfoundland is nearly as large as Cuba. It is probably most famous for its enormous fishing industry, carried on at the Grand Banks, the greatest fishing grounds in the world. Despite its barren appearance, Newfoundland is richly endowed with natural resources.

Geography and Climate. The coast of Newfoundland is extremely rugged, particularly in the southwestern part, where the coastal mountains, lying only a few miles from the shore, reach a height of over 2,000 feet. The interior consists of a broken tableland intersected by several rivers and dotted with lakes and marshes. In some places the land is heavily forested.

The climate of Newfoundland is milder in winter than is the general climate of Canada as a whole, but the summers are not so warm. It is colder on the northeastern coast than elsewhere because of the frigid Labrador Current, which comes from the Arctic regions. The rainfall is more plentiful than it is in Labrador, in some parts of the south averaging from forty to sixty inches a year.

Labrador is a barren, rugged land with a cold, bleak climate (see LABRADOR).

Resources and Industry. The greatest resource, employing the most people and providing the greatest revenue, is in the fisheries. The forests are second in importance, supplying the pulpwood used in Newfoundland's extensive paper manufactures. Great wealth lies underground, chiefly in the form of copper, iron, coal, pyrites, lead, and gypsum. Labrador contains high grade iron ore The world's largest underwater iron workings are near Belle Isle, between Newfoundland and Labrador.

Agriculture never has been an important industry in Newfoundland, although land in the interior is suitable for farming. Potatoes, turnips, and hay are grown. Mink farming is popular. Whale meat is used as food for the minks. Trappers take beaver, ermine, fox, lynx, and muskrat.

Transportation and Trade. Many international airlines use the Gander Airport on flights to and from Europe. Gander is about 1,000 miles east of New York City. It is nearer to Europe than any other point in North America. Exports include fish and fish products such as cod-liver oil, seal oil, and sealskins, newsprint, and iron. Newfoundland's major imports are flour, coal, and machinery.

Government. Newfoundland became a self-governing colony in 1855. With Labrador it formed the Dominion of Newfoundland from 1917 to 1933, when Dominion status temporarily was suspended. In 1949 it became Canada's tenth province following a plebiscite in which the residents of Newfoundland expressed their desire to become a part of Canada.

The People and Their History. The majority of the 430,000 inhabitants are descendants of the English, Scottish, and French fishermen who came in the early 1600's. Most of them live in the south and along the coast. St. John's, the capital, may be the oldest city in North America. It was founded in the 1500's and is the only large city. Population of its metropolitan area is about 80,000.

The first people to visit Newfoundland were the vikings, who discovered it nearly 1,000 years ago. John Cabot reached the island in his voyages and claimed it for England in 1497, thus making it Great Britain's earliest overseas colony. It was about a century later before the British began active colonization. There were frequent conflicts with France, but at the close of the War of the Spanish Succession, in 1713, England gained complete control, although France was allowed fishing rights on the Grand Banks. In 1832 representative government was granted, and from 1855 to 1917 Newfoundland was a British colony. In that year Newfoundland and Labrador became a Dominion in the British Commonwealth of Nations. They were forced in 1933, because of economic difficulties, to give up Dominion status for that of a British colony. In 1949, as a result of a plebiscite, Newfoundland became a province in the Dominion of Canada. See CANADA, DOMINION OF.

HEROIC, NOBLE NEWFOUNDLAND

NEWFOUNDLAND DOG. While some dogs gain friends among men because of their ability as hunters, as herders of sheep, or as guardians, there are few dogs that are more genuinely entitled to our respect than Newfoundlands. The only dogs that can equal them in kindly disposition, willingness to help, and ability to save life single-handed, are the Saint Bernard dogs.

Newfoundlands are large, long-haired dogs, weighing from 120 to 150 pounds and standing from twenty-five to twenty-seven inches high at the shoulder. Their deep voices command the respect of intruders. Newfoundland dogs are excellent swimmers and endure excessive cold better than most dogs. Many records of saving the lives of drowning persons have been justly credited to these splendid animals. It is unfortunate that the breed is not more common than it is, but dogs of the size of Newfoundlands are expensive pets to feed, and much of the everyday work which they did formerly is now provided for in other ways.

Newfoundland dogs may be all black, or white with large black patches over the body, ears, and eyes.

Courtesy Raymond-Whitcomb, Inc.

JUNGLE RHYTHMS

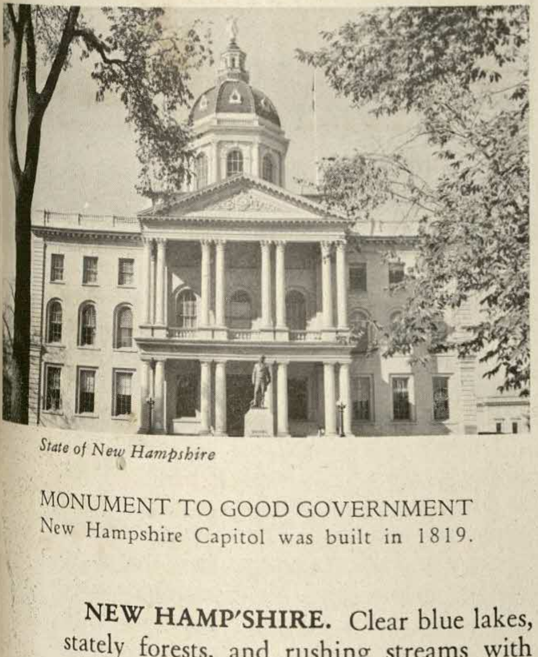
New Guineans dance and sing in wild rites.

NEW GUINEA, *gin'e.* In the Western Pacific Ocean just north of Australia is New Guinea, a mountainous, tropical island. Rugged mountains run through the center of the island. The coastal lowlands are steaming, trackless jungles, displaying a profusion of wild tropical plants and trees. Wild life includes the gorgeous birds of paradise and other brightly colored birds. The climate is so hot and humid that white people find it difficult to live there. With an area of about 305,000 square miles, New Guinea is the second largest island in the world. Only Greenland is larger. The eastern, Australian half has about 1,312,000 people. The Dutch portion has a population of about 730,000.

Wherever the jungle has been cleared, agriculture has proved profitable, the chief products being coconuts, cacao beans, coffee, yams, sago, bananas, rubber, and sisal hemp. The trade of the island is carried on chiefly with Australia, through the ports of Samarai, Daru, and Port Moresby.

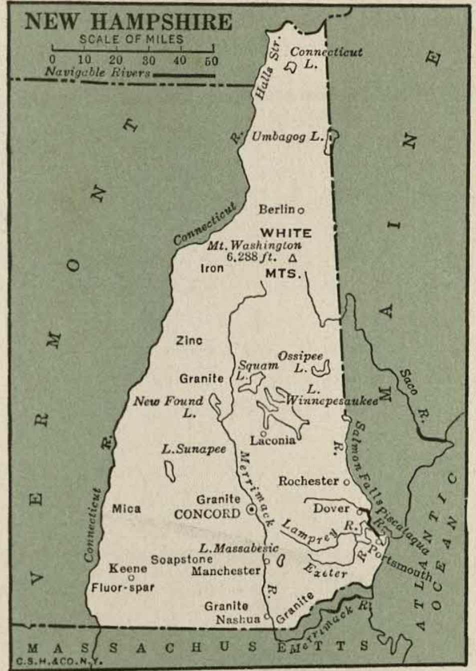
England, Germany, and the Netherlands controlled New Guinea at the beginning of World War I. Germany was forced out entirely. The Netherlands retained its control of the island's western half. The eastern half came under Australian rule after 1914 through a mandate from the League of Nations and, later, a trusteeship from the United Nations.

Japan conquered the island with the idea of using it as a base for an invasion of Australia in the early days of World War II. The Japanese were successful but could not hold their gains. American troops reconquered the island with the aid of Australians. It was not included in the new state of Indonesia created after the end of the war.



State of New Hampshire

MONUMENT TO GOOD GOVERNMENT
New Hampshire Capitol was built in 1819.



THE SWITZERLAND OF AMERICA
New Hampshire is noted for mountain scenery.

NEW HAMP'SHIRE. Clear blue lakes, stately forests, and rushing streams with picturesque waterfalls contribute to the natural beauty of New Hampshire, one of the New England states. Although it is known as "the Granite State" because of its great stone mountains, it is most noted for its beautiful scenery, and every year thousands of vacationers enjoy the attractions of this summer playground. There are, besides, numerous historical sites and monuments, for New Hampshire was one of the original thirteen states and is steeped in the history and traditions of the early days.

New Hampshire is shaped roughly like a right-angle triangle. On the north it touches Canada; its western boundary is formed by the Connecticut River, beyond which lies Vermont; on the south is Massachusetts; and on the east is Maine. In the extreme southeastern corner an eighteen-mile stretch is on the Atlantic coast. The area of New Hampshire is 9,304 square miles. The population is about 606,000.

Surface Features. In the southern part of the state, the land is rolling, with many hills and few mountains. The surface grows more rugged as it slopes upward to the central portion of the state, where rise the White Mountains, a part of the Ap-

MANCHESTER INDUSTRIES BOLSTER NEW HAMPSHIRE'S PROSPERITY

Manchester, above, as viewed from across the Merrimack, offers bustling proof of its industrial leadership. Large buildings, formerly part of the giant Amoskeag cotton mills, are now occupied by smaller industries. Below, delicate electrical, aircraft, and navigational instruments, and photographic exposure meters are assembled at a Manchester plant.

State of New Hampshire

palachian chain. The Saco River divides the mountains into the Franconia and Presidential ranges. The sun shining on the bare, rocky peaks reflects a white light which gives the mountains an appearance of being snow-covered. The highest peak, Mount Washington, has an elevation of 6,293 feet above sea level. Many of the rivers of the state rise in the mountains and have cut deep, rocky gorges on their way to the sea.

The eastern portion of the state is drained by the Piscataqua and Saco rivers, the central part by the Merrimack, and the western by the Connecticut and its tributaries. These rivers are swift-flowing streams which supply valuable water power to the mills and factories along their banks. Near the center of the state are several large lakes noted for their scenery, among them Winnepesaukee, the largest and most beautiful.

Climate. Summer in New Hampshire affords some of the most pleasant climate to be found in North America. It is mild, cool, and healthful. The winters, however, are severe, with the temperature frequently falling below zero. The average yearly temperature for the state is about 48°F. The average annual rainfall is forty-five inches.

Natural Resources. New Hampshire's most valuable natural resources are the extensive forests and the water power furnished by the rushing streams. The chief mineral is granite. Second in importance are the mica deposits, in which New Hampshire is exceeded only by North Carolina. Other minerals include soapstone, limestone, slate, feldspar, gold, silver, lead, and zinc.

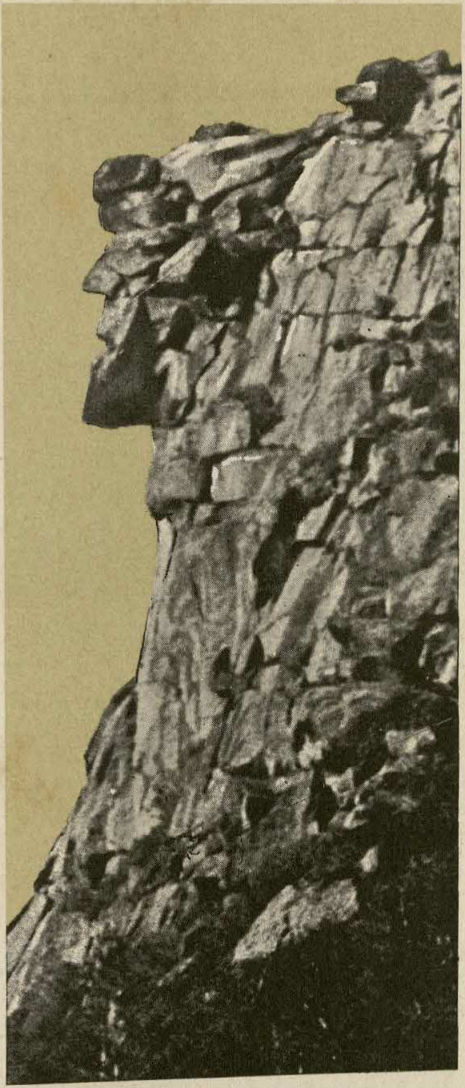
Despite the fact that the pine forests of New Hampshire have been greatly depleted, the state still ranks high in the production of lumber. The most important commercial timber is the red spruce, which is used by a large paper and wood-pulp industry. Nearly as valuable as spruce are the stands of birch, beech, oak, and cedar.

Farming in New Hampshire. Agriculture was at one time the leading industry of the state; but with the development of hydroelectric power, manufacturing has forged to the front. Farmers are greatly handicapped by thin and rocky soil, which is difficult to cultivate. The most productive lands are composed of the rich alluvial soil of the river valleys. The leading farm crop in value is hay, followed by potatoes, corn, oats, and orchard fruits, such as apples and peaches. Tobacco is also raised extensively. The most important phase of agriculture is dairying, followed by the raising of cattle, horses, and poultry.

Manufacturing Industries. The abundance of water power, excellent transportation facilities, and nearness to the great markets of New England have been the chief reasons for New Hampshire's industrial progress. The leading manufactured articles are cotton, woolens, and other textiles. Second in importance are boots and shoes, followed by paper, wood pulp, and other lumber products. Other leading products are electrical goods, leather, silverware, and furniture. The chief industrial cities are Manchester, Nashua, and Concord.

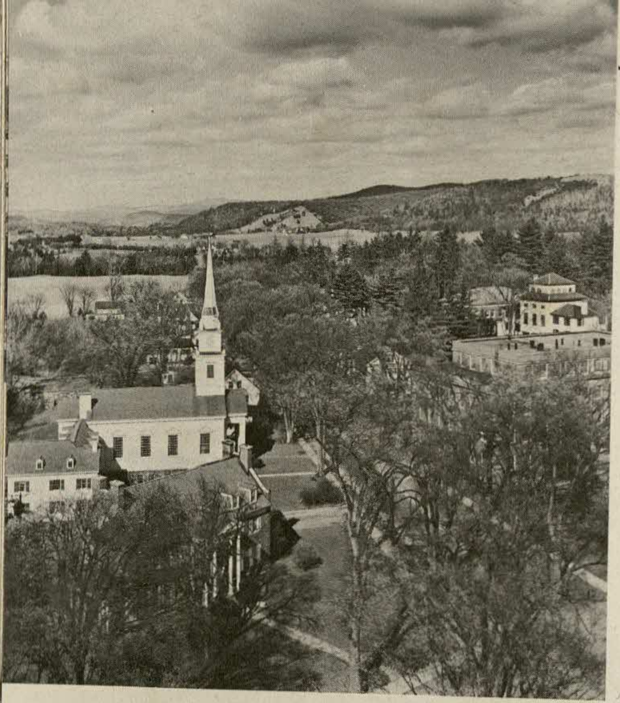
Government and Education. New Hampshire has a two-house legislature, the members of both houses being elected for two years. Each of twenty-four districts in the state elects one senator to the upper house. Each of the members of the house of representatives is elected to represent a certain portion of the population. In addition to the governor, the executive department is composed of a council of five. Other state officers are elected by the legislature, but the governor and council are elected by popular vote. Heading the judiciary is a supreme court with five judges. Concord is the capital.

New Hampshire has one of the oldest



A STORIED LANDMARK

Three ledges of rock jut from a steep cliff in the Franconia Range of the White Mountains to form the Great Stone Face.

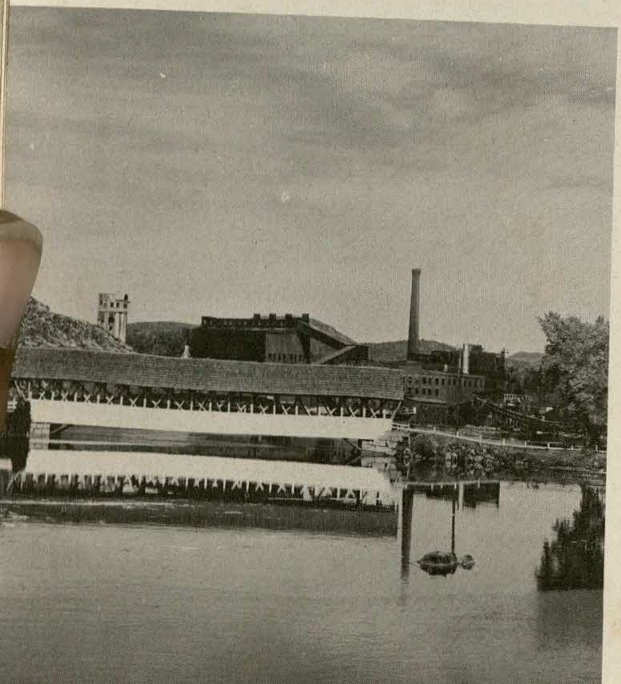


UPI

STUDY, SPORTS, AND WORK

Above, picturesque Hanover, on the Connecticut River, is the seat of Dartmouth College. In the background rise the hills and ski trails that have made New Hampshire one of the world's great winter sports areas. Below, an old covered bridge spans the river near a paper mill at Groveton, N.H. Pulp and paper products rank high among the state's manufactures.

State of New Hampshire



school systems in the United States. The cost of education is borne by local governments rather than the state government. The school term lasts for at least thirty-six weeks, and children are required to attend until they are fourteen years of age—or sixteen if they have not completed the elementary grades. Higher education is carried on at two state normal schools and the University of New Hampshire, at Durham. Two famous private preparatory schools in the state are Phillips Exeter Academy, at Exeter, and Saint Paul's School, at Concord. The leading private institution of higher learning is Dartmouth College, at Hanover.

History. The first white man known to have explored the region of New Hampshire was Martin Pring, who visited the valley of the Piscataqua River in 1603. Large grants of this territory were made to George Mason in 1623. It was Mason who named the territory New Hampshire after his native Hampshire County in England, although he himself never saw the new land. The first permanent settlement was at Rye, in 1623.

The early history of the state tells of frequent land disputes and many wars with the Indians. The colony joined with Massachusetts and was ruled as a royal colony until 1741. New Hampshire participated in the Revolutionary War and was the ninth state to ratify the Federal Constitution. The state has had three constitutions, the first one going into effect in 1776, the second in 1784, and the third in 1792. Modifications have been made in the last constitution on several occasions. See CONCORD; WHITE MOUNTAINS.

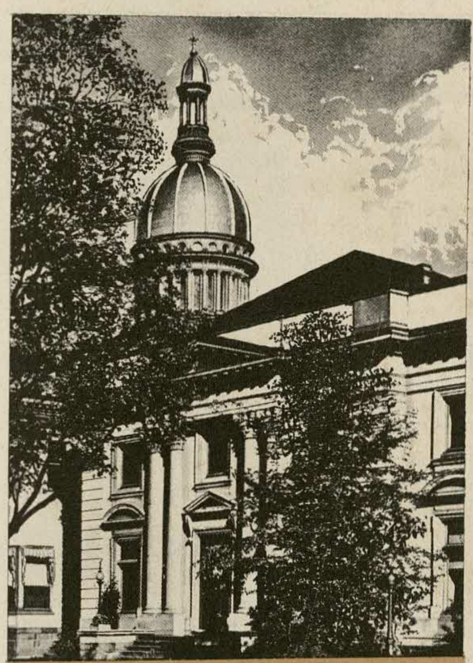
NEW HA'VEN, CONN. Situated on a low plain that surrounds a bay of Long Island Sound is one of the oldest cities in the United States and the second in size in Connecticut. It is New Haven, founded in 1638 and today noted as a thriving manufacturing center and the seat of Yale University. At one time New Haven was a leading shipbuilding center, but shipbuilding has largely been replaced by more varied manufactures. The principal products of the city's factories are arms and ammunition, clothing, machinery, clocks, hardware, wire, and rubber and paper products. In addition, it is one of the leading jobbing and wholesale centers in the East.

New Haven lies less than a hundred miles northeast of New York, and is connected with it by several divisions of the New York, New Haven, & Hartford Railroad. It is the terminal of an electric line that serves the whole state of Connecticut. Transportation is also supplied by steamship lines that carry freight and passengers to New York City. Lying between the Quinnipiac and the West rivers, the city has a beautiful setting. It is noted for its parks and playgrounds, in which are located several historic sites and monuments.

A sixteen-acre square, called The Green, was laid out by the first settlers and is still the center of the city. Some of the buildings of Yale University and three very old churches face The Green.

The city was first settled by a group of Puritans at a place which was called Quinnipiac by the Indians. It was given the name of New Haven in 1639, when it became the capital of New Haven Colony. This colony joined with Connecticut Colony in 1664. New Haven and Hartford were both capitals of Connecticut from 1701 to 1873. In 1784 New Haven received a city charter. The population is about 150,500.

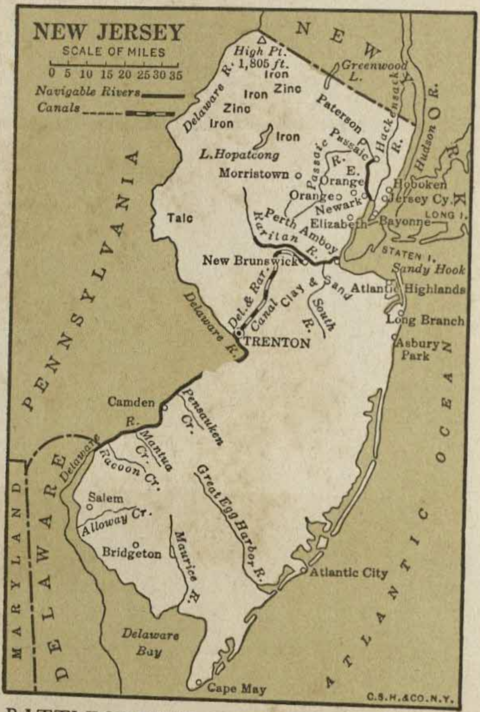
NEW HEBRIDES, *heb' ri deez.* More than forty small coral and volcanic islands make up the group of the New Hebrides, which lie in the Pacific Ocean east of Australia. These islands lie in an earthquake region and some of them contain active volcanoes. Their humid tropical climate is very unhealthful, but their fertile soil produces large crops of oranges, coconuts, breadfruit, bananas, sandalwood, coffee, and corn. They also contain valuable deposits of sulphur. The natives, who were formerly cannibals, number about 90,000. England and France govern the islands jointly.



GOVERNING THE GARDEN STATE
The golden-domed Statehouse of New Jersey overlooks the Delaware River at Trenton.

NEW JER'SEY. In spite of the fact that New Jersey is one of the smallest states in the American Union, few others have taken as important a part in the history of the United States. Nor can any other states boast a larger variety of manufactures or agricultural products. New Jersey is popularly called "the Garden State." It belongs to the Middle Atlantic group of states and was one of the thirteen original colonies. It is almost surrounded by water. The entire western boundary is the Delaware River, beyond which lie Pennsylvania and Delaware. To the south is Delaware Bay, to the east are the Atlantic Ocean and the Hudson River, and to the north is the state of New York. New Jersey has an area of 7,836 square miles. The population is about 6,079,000.

Features of the Land. New Jersey is located on the Atlantic slope of North America and is divided into four topographic regions. The first of these regions is the Appalachian zone, in the north, composed of the Kittatinny Mountains and the



BATTLEGROUND OF THE REVOLUTION
New Jersey was a center of warfare in 1780.

Kittatinny Valley. This region is characterized by high, rolling hills and shallow valleys which contain rich farm lands. At no place are the mountains higher than 1,800 feet, and running through them is the beautiful Delaware Water Gap.

To the southeast is the second zone, the Highlands, a region which has a rolling surface. The valleys here are devoted chiefly to farming. The whole area is a succession of plateaus, sloping from a height of about 1,500 feet. Lying to the east is the Piedmont plain, with a number of low mountains and ridges which gently slope to the sea. The fourth zone is the coastal plain, which includes the southern half of the state. Most of this region is less than 100 feet above sea level, and the whole plain slopes gently eastward.

The Delaware River, with a number of tributaries, drains the western part of the state. In the north are the Raritan, the Passaic, and the Hackensack. In the northeast the Hudson forms the eastern boundary between New York and New Jersey.

Climate. New Jersey's climate varies from north to south, a difference which makes possible a wide variety of crops. The temperatures in north and south may differ on one day as much as 20 degrees. The average temperature is about 52°F. The yearly rainfall is about fifty inches.

The sandy beaches and the climate along the seashore have made the seaside area containing Atlantic City and Asbury Park one of the nation's most famous recreational centers.

Natural Resources. Large clay deposits are the basis of brick, tile, and pottery industries. Zinc is the only important mineral in the state. Sand, gravel, and cement material for building are plentiful. Fishing along the sea coast and in the rivers is an important industry. Oysters, sea bass, crabs, scallops, and fresh water trout are caught in large quantities.

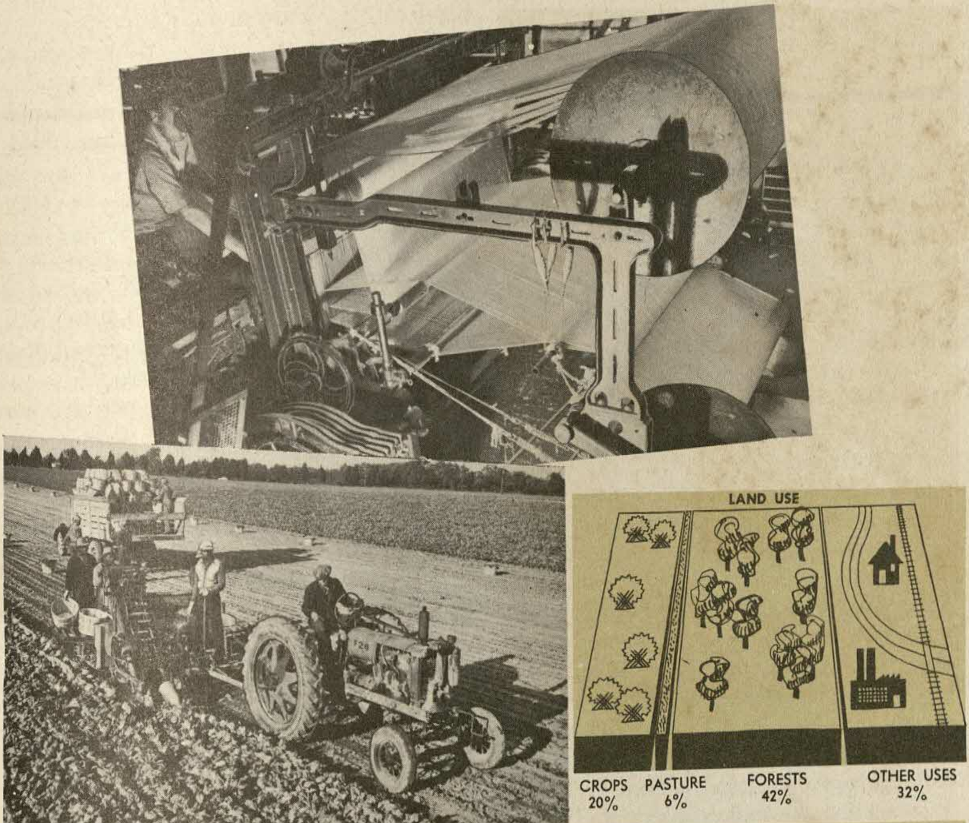
More than 40 per cent of New Jersey land is forested. Many thousands of acres have been planted in a conservation program. Among the trees are oak, maple, birch, tulip, basswood, ash, elm, white cedar, and pine.

Manufacturing. New Jersey ranks seventh among the states in the value of its manufactures. Income from this source is many times greater than the combined income from agriculture, fisheries, mining, and forests. More than one-third of its workers are employed in industry.

New Jersey produces more chemicals than any other state. It also manufactures a large amount of electrical machinery for use in telephone, telegraph, and radio equipment. Other important products are furniture, textiles, leather, photographic films, cutlery, and jewelry.

The processing of the many kinds of vegetables grown on New Jersey farms also is an important industry.

Agriculture. New Jersey's deep, rich, easily cultivated soil has made it a leading agricultural state. Its farms have benefited considerably from their nearness to large cities, which prove ready markets for the



Courtesy R. I. Nesmith and Associates; N. J. Dept. of Agriculture

JERSEY MANUFACTURES AND AGRICULTURE RANK HIGH

Its strategic location on the eastern seaboard has contributed greatly to the progress of New Jersey. Top: One of the state's busy textile mills. Below, left: Harvesting spinach by machine on a New Jersey farm. Below, right: How the state's land is put to use.

dairy products, vegetables, and fruits they provide. Among the vegetables grown on truck farms are tomatoes, potatoes, asparagus, cauliflower, cucumbers, eggplants, and carrots.

Many kinds of berries, including cranberries and cultivated blueberries, are grown in New Jersey. Its orchards produce apples and peaches. New Jersey stands second only to Hawaii among the states in the growing of orchids.

Transportation. New Jersey has excellent transportation facilities by ground, sea, and air. Tunnels, bridges, and highways connect it with New York City. Two of its famous highways are the New Jersey Turnpike, a toll road 118 miles long, and the Garden State Parkway, part free and part toll, which extends the entire length of the state.

Raritan Bay and the Delaware River are navigable for large vessels. There are two large ports, the Newark Seaport, operated by the Port of New York Authority, which also operates the Newark Airport, and the Delaware River Port, run by the Delaware River Port Authority of Pennsylvania and New Jersey. There are about seventy licensed commercial airports in the state.

The People and Their Government. A large percentage of the population of New Jersey lives within twenty-five miles of New York City. Many people, having their places of business in New York City, commute daily. The largest cities are located in the northern part of the state. They include

Newark, Paterson, and Jersey City. Other leading cities are Trenton (the capital) and Camden, in the western part.

The governor of New Jersey is elected for three years. Some of the state officers are elected by the legislature; the others are appointed by the governor. The upper house of the legislature is made up of twenty-one senators, each representing a single county for three years. The lower house, called the general assembly, has sixty members, each elected for one year.

Education. The educational system of New Jersey has long been considered one of the best in the United States. It is also one of the oldest in the country, for the first school was founded in 1661. School attendance is compulsory for children from seven to sixteen years of age, and elementary instruction is free to everyone between the ages of five and twenty. The state board of education is at the head of the school system, which includes primary and secondary schools and teachers' colleges. Rutgers University, founded in 1766, now is the state university. It has the Football Hall of Fame. Other schools include Newark College of Engineering, Stevens Institute of Technology, and Princeton, Drew, Seton Hall, and Fairleigh Dickinson universities. There are several women's colleges.

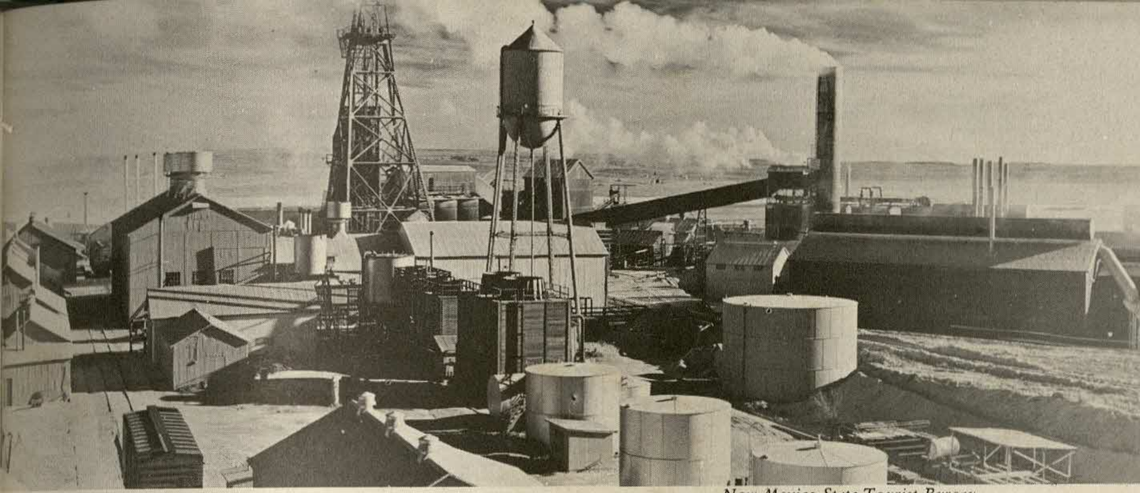
History. Although New Jersey had been thoroughly explored at an earlier date, the first permanent settlement by the Dutch was not established until about 1617. Other settlements soon followed, founded by the Swedes and the English. The Swedish settlements fell into the hands of the Dutch, who, after continual conflicts with the English, lost their colonies in 1664. In that year both Berkeley and Carteret received royal grants to the territory; and between them they divided it into two parts, East and West Jersey. In 1682 William Penn purchased East Jersey. However, soon after the beginnning of the eighteenth century, the two territories were again joined.

New Jersey, as did the other colonies, supported the English in their fight against the French and Indians. However, during the Revolutionary War it fought for independence from England, and several important battles were fought within the state. New Jersey, noted in colonial times for its independent character, opposed a strong central government at the Constitutional Convention. It submitted the famous New Jersey Plan, which gave the states great power. Nevertheless, New Jersey was the third state to ratify the Constitution.

New Jersey State Promotion Section, and Dept. of Agriculture

MENLO PARK WIZARD, AND POULTRY PRODUCTS

Thomas A. Edison Tower marks site of great inventor's laboratory. Chickens and eggs provide one-third of New Jersey's farm income. Eggs and chicks are sold as far away as Europe.



New Mexico State Tourist Bureau

FERTILITY FROM BARREN LANDS
Large quantities of potash, vital in fertilizer manufacture, are mined in New Mexico.

The Land Of Enchantment

NEW MEXICO. Although it is one of the youngest states in the United States, New Mexico was nevertheless the home of an ancient civilization. Within its borders are Los Alamos, the birthplace of the world's first atomic bomb, and the remains of a prehistoric race of cliff dwellers. Here also is spectacular natural beauty. Southeast are the famous Carlsbad Caverns, believed to be the most extensive underground caves ever discovered. New Mexico has a strange charm, with its blue skies and its sage-covered desert and colorful rocky formations, bathed in sunshine and boldly outlined in the clear atmosphere. With an area of 121,666 square miles, New Mexico ranks fifth in area among the states.

The Land and Its Features. New Mexico is on an elevated plateau at the southern end of the Rocky Mountains. To the north lies Colorado, to the east Oklahoma and Texas, to the south Mexico, and to the west Arizona. The surface of the state slopes to the south and southeast. There are many mountain ranges, all belonging to the Rockies, and most of them have a north-south direction. Several peaks in the north reach heights of more than 12,000 feet. The lowest altitude of about 2,800 feet is found in the extreme southeast corner of the state. The mountains are separated by valleys of varying depth. The valleys in the north are narrow and deep; in the south the valleys of the Rio Grande and Pecos rivers are several miles wide in some places, and the banks are low. In the southeast is the level plateau of the Staked Plain (*Llano Estacado*), and in the west are the smaller and higher Plains of San Augustine. Except in the mountains, most of the state appears to be a desert, because of the arid climate.

Although New Mexico has numerous rivers, none is navigable and several are usually dry for the greater part of the year. The northeastern section is drained by the Canadian River. Flowing through the center of the state from north to south is the Rio Grande. In the northwest is the San Juan River, in the west and south are the San Francisco and the Gila, and in the east is the Pecos.

Climate. For the most part, the climate of New Mexico is dry, although some of the highest mountains receive twenty to

Bloom from Monkmeyer

YOUNG CAPITOL IN AN OLD CAPITAL

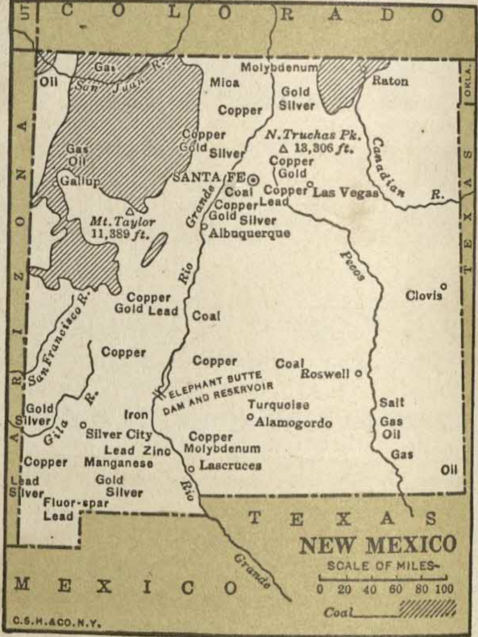
New Mexico capitol, built in 1951, stands in Sante Fe, seat of government since 1610.

thirty inches of rain a year. However, there are parts that have great extremes of temperature, particularly in the north. Because of the low humidity, the temperature is not oppressive in any part of the state, and the sunshiny days and mild, dry climate attract thousands of health seekers.

Natural Resources. Since the time of the early Spaniards, New Mexico has yielded valuable minerals which are found chiefly in the mountain regions. The state has important copper deposits and, in the north, huge coal deposits which are among the largest in the United States. Although there are extensive iron deposits, they have not been greatly developed. Gold and silver are next to coal in value. There are also deposits of zinc, lead, gypsum, mica, manganese, building stone, and precious stones.

There are millions of acres of forests in New Mexico. The most valuable commercial timber is pine, but oak, cedar, walnut, birch, and maple are also found.

Farming in New Mexico. Next to the mining industry, agriculture is the leading industry. Because of the difficulty in producing crops without the aid of irrigation, livestock raising is of great importance. New Mexico has vast areas of range land and is one of the leading states in number of cattle and sheep. Along the banks of streams and springs there is sufficient grass to feed large herds of cattle, and even in the non-irrigated desert land the shrubs and sage provide forage for large numbers of animals.



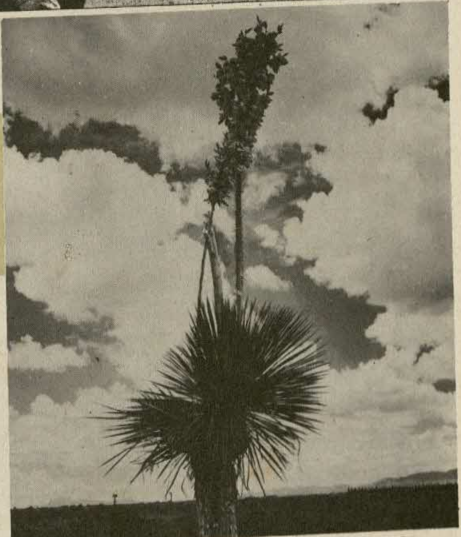
VAST RESERVE OF RESOURCES

The fourth largest state in the Union, New Mexico holds untold store of undeveloped wealth.

Most of the crop-raising land is irrigated, and the productive areas are found in the river valleys. Here the crops are certain and the farming is intensive. Most of the farms are small. The leading crops are hay, corn, wheat, potatoes, oats, and cotton. Most of the irrigated land, however, is given over to the raising of fruits. Apples and pears are the chief products, but the production of plums, peaches, apricots, and cherries is increasing. Grapes are also grown abundantly.

Manufacturing and Transportation. Manufacturing in New Mexico is not extensive, although it is becoming increasingly important. The largest industries are those concerned with the smelting and refining of copper and iron ore and the construction and repair of railroad equipment. There is also a considerable amount of petroleum

Santa Fe Railroad
New Mexico State Tourist Bureau
LAND OF ENCHANTMENT
Home of an ancient civilization, New Mexico was also a center of the earliest European settlement in the United States. Above, Taos Pueblo. Right, the yucca, state flower.

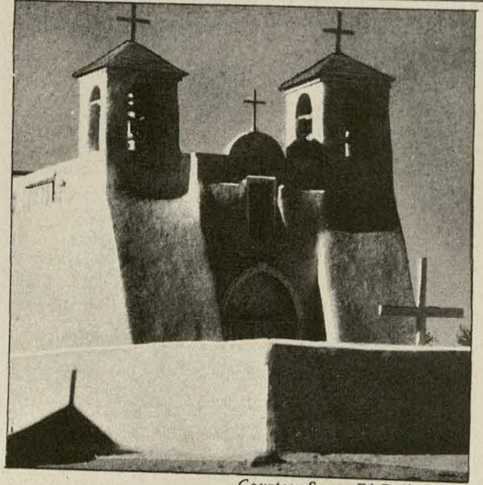


refining. The manufacture of lumber products is a leading industry, and there are a number of flour mills, sugar-beet factories, and canning plants.

Considering its size, New Mexico has excellent transportation facilities. Included in the 3,000 miles of railroads are transcontinental trunk lines that cross the state from east to west. There are, in addition, north-south lines, thus providing adequate rail communication.

The People and Their Government. Unlike most other American states, New Mexico has several distinct groups within its borders. Among them are the Pueblo and Navaho Indians, who live chiefly in the valley of the Rio Grande. Although they have adopted some American customs, they have retained many of their own. There is a large Spanish-American population that has its own distinctive customs and habits. Then there are the mixed types, called *mestizos*. The greater part of the population, however, is made up of "Anglos"—whites of mainly Anglo-Saxon tradition. The state has about 953,000 people. Most of them live on farms, and there are few cities. The largest city, Albuquerque, has a population of about 201,000. Santa Fe, the capital, has about 35,000 inhabitants.

The governor and other state officers are elected for two years. The state judiciary



Courtesy Santa Fé Railroad

SHRINES OF HISTORY AND ROMANCE
The "City of Sacred Faith," Santa Fe, calls itself the center of the most interesting fifty-mile square in America. Its Art Museum (above) is filled with specimens of Southwestern art. Below, mission at Ranchos de Taos.

is made up of a supreme court, probate, and district courts. The upper house of the legislature is composed of twenty-four members elected for four years; the house of representatives has fifty members serving two years.

Education. The state superintendent and local boards of education supervise the public-school system. School attendance is compulsory between the ages of six and sixteen. Because many of the people speak only Spanish, the state has had a high illiteracy rate, but a progressive school system is rapidly improving the situation. In addition to the white schools there are twenty-six Indian schools under the supervision of the Federal government. The state maintains three normal schools, a college of agriculture, a school of mines, and the University of New Mexico, at Albuquerque.

History. New Mexico was first explored by the Spaniards in 1539, and a year later extensive explorations were made by Coronado. The white men encountered fierce resistance from the Indians, and it was not until 1598 that a settlement was established. The capital, Santa Fe, was founded in 1609.

New Mexico was a Spanish province until 1821, when Mexico gained its independence. In that year the territory became a part of Mexico, and so it remained until 1846. There soon grew up a prosperous trade carried on over the Santa Fe trail between the province and the United States. Mexico was defeated in the war with the United States, and by the Treaty of Guadalupe Hidalgo, New Mexico became a part of the United States. Congress made it a territory in 1850. New Mexico covered a considerably larger area then than it does now, and later it was enlarged still more by the Gadsden Purchase. However, part of its land was taken to form the territories of Colorado and Arizona. In January, 1912, New Mexico was admitted to the Union as the forty-seventh state.

For additional information, consult the following articles:

- Cliff Dwellers
- Gadsden Purchase
- Guadalupe Hidalgo, Treaty of
- Irrigation
- Mexican War
- Rio Grande
- Santa Fe

Courtesy Southern Pacific Railroad

LANGUID CHARM ALONG THE TECHE

Near New Orleans is the romantic "Cajun" country where old plantations tell of other days.

NEW ORLEANS, *awr'le anz,* LA. Celebrated from coast to coast for its famous Mardi Gras festival, and famed as one of America's scenic spots, New Orleans, "the Crescent City," seems to waft the visitor into another world as he tours its famous old French quarter. The city was originally founded by the French. It was ceded, along with the rest of Louisiana, to the Spanish, later returned to the French, and finally sold to the United States in 1803 as a part of the Louisiana Purchase.

Located on a crescent-shaped bend of the Mississippi, 110 miles above its mouth, New Orleans is the largest city in the state, and is the leading port on the Gulf of Mexico. It is 930 miles south of Chicago and about 640 miles down the river from Saint Louis. Although the corporate limits include the entire parish of Orleans, 196 square miles, the city proper occupies but forty square miles.

There are two sharply contrasting sections of New Orleans—the old French quarter and the modern American section. In the old section is seen the picturesque Spanish Cabildo, built in 1795. It was in this building that the Louisiana Territory was transferred from Spain to France, and here also occurred the transfer of the territory from France to the United States. The old French Opera House and the Ursuline Convent, built in 1730, are other notable structures to be seen here. French language and French schools predominate. Narrow, crooked streets and colorful dwellings are in sharp contrast to the modern section of the city.

Dividing the old section from the new is Canal Street, a busy thoroughfare 170 feet wide. Along its broad expanse rise massive buildings, fine hotels, and magnificent banks. Numerous parks add to the charm of the city's colorful background. Intersecting Canal Street in the very center of the business district is Saint Charles Street, on which are located the city's finest residences. Outstanding structures in the city include the Delgado Art Museum, the Confederate Memorial Hall, and Tulane University. Along the shores of near-by Lake Pontchartrain are numerous amusement resorts.

Nine large railroads and several smaller ones enter New Orleans. The long water front is dotted with busy wharves. Bus lines and airports aid in giving New Orleans the finest transportation in the entire Southland. The city is an important lumber and banana port, and one of the largest cotton markets in the world. Its varied industries include petroleum refining, rice polishing, coffee grinding and roasting, and sugar refining, and among its manufactures are cot-

BACKWOODSMEN'S FIRE WITHERS BRITISH SQUARES

Crack British regiments advancing on New Orleans in mass formation could not stand the terrific fire of Andrew Jackson's embattled sharpshooters: they broke and fled.

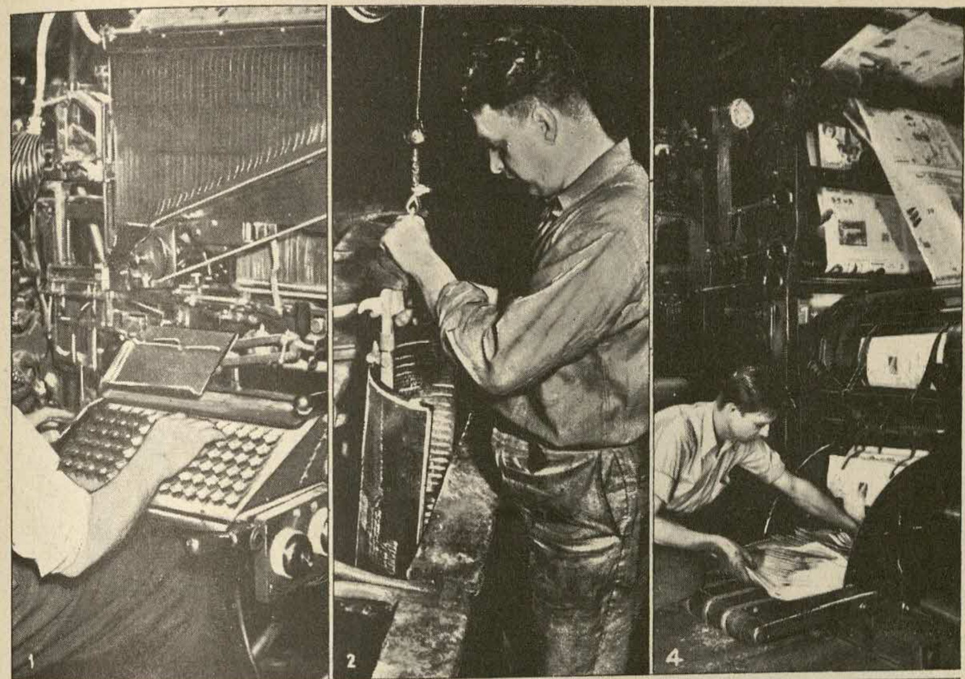
tonseed products, molasses, lumber, and tobacco products. The annual value of the manufactures exceeds $200,000,000.

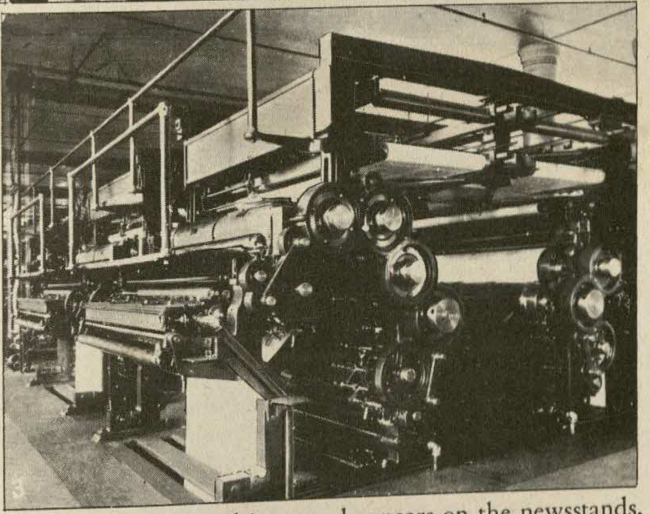
New Orleans was laid out by Jean Baptiste le Moyne, Sieur de Bienville, in 1718 and was named for the Duke of Orleans, at that time regent of France. Four years later it was made the capital of the lower Mississippi area. In 1762 it was ceded to Spain, was returned to France in 1800, and sold to the United States in 1803. It was the site of the last battle of the War of 1812.

As the cotton trade developed, New Orleans increased in population to 100,000 at the beginning of the Civil War. Captured by the Union forces in 1862, it was used as a base of supplies and remained under military government during the entire war. The capital was moved to Baton Rouge in 1880. The city is governed by a mayor and a commission council of five departments. The population is about 627,000.

NEW ORLEANS, BATTLE OF. Andrew Jackson attained increased prominence in American affairs as a result of his victory over the British in the Battle of New Orleans. Fought on January 8, 1815, near the city of New Orleans, the battle had no effect on the outcome of the War of 1812, for the treaty of peace had already been signed. Neither Jackson, commanding the American backwoodsmen and volunteers, nor the British, under Sir Edward Pakenham, knew of the treaty, however. Fighting behind earth breastworks, the Americans lost only eight men; the 7,000 British regulars who had just landed from England lost 2,600. See WAR OF 1812.

NEWSPAPER. To record what people do and what they think is the function of the newspaper, civilization's chief means of circulating news. The newspaper, physically, is a number of folded sheets of paper ranging in size from tabloid to blanket





THE MECHANICS OF THE NEWS

Today, the metropolitan daily newspaper is a vast, highly mechanized enterprise. Inventors and engineers have designed faster and bigger equipment so that the modern edition of a daily pours onto the streets at tremendous speed. Long batteries of linotypes set copy as fast as it comes from the editors (1). (2) Stereotype curved plates are made to fit the cylinders of block-long presses (3) which print paper rushing through them at over one hundred miles an hour. The papers come out folded and counted, ready to sell (4).

(2) Courtesy Internat. Nickel Co.
Ewing Galloway

page, on which news, editorials, illustrations, cartoons, advertisements, and other material are printed. The newspaper is more than that, however. It is a force in the affairs of men, and despite the growth of radio, moving pictures, and the decline of its own influence, the newspaper still provides a wealth of information, opinion, entertainment, and interpretation.

News, from the happening of an event until its record appears on the newsstands, goes through a series of high-speed, well-organized processes. First, it must be obtained, then written, set up in type, printed, and finally distributed. On a daily newspaper, the editorial department is under the managing editor. The news of the city in which the paper is published is gathered by reporters directed by the city editor. They may write their "stories" in the local room of the paper, or telephone them to rewrite men. The stories then go to the copy desk, where they are edited and given headings or headlines.

Next, the material is sent to the composing room, where it is set up in type on the linotype machine. A proof is pulled from the type, and this is proofread, so that corrections may be made in the metal. The type is then arranged in page forms. Each of the locked-up forms is impressed on a matrix, from which a curved metal plate is made, which is inserted on a cylinder of the press. The paper rolls between the swiftly moving cylinders and comes out at one end of the roaring press as a newspaper, neatly cut, folded, and ready for the newsboy's cry. The circulation department, under the circulation manager, has charge of distributing the paper.

Since a newspaper usually sells for only a few pennies, the revenue to maintain such a costly enterprise must be obtained from advertising. The task of securing "ads" and laying them out is directed by the advertising manager. On many small papers, one or two men perform all the tasks on a newspaper.

To secure news from other cities and countries, many newspapers maintain correspondents who write, wire, or telephone their stories to the paper. News services send dispatches over teletype machines which click out the events of the world on an endless roll of paper. A recent invention sets up a story in type as it is being sent from the news service, saving considerable time and expense. Pictures are taken both by the paper's own photographers and by agencies engaged in that business. Radio, telegraphic, and telephonic transmission of photographs permits papers to receive pictures as soon as they are developed. Editorials are written under the direction of the editor in chief, who may or may not be the publisher.

Although the first form of circulating news other than by word of mouth originated in ancient Rome, it was many years before the first newspaper made its appearance. This was the hand-written *Notizie Scritte,* posted in Venice in 1556. The first daily newspaper appeared in Germany in the seventeenth century, and the first in England, the *Daily Courant,* appeared in 1702. The first daily newspaper in America was the *Pennsylvania Packet and Daily Advertiser,* published in Philadelphia in 1784. The oldest daily newspaper in the United States with a record of continuous publication is the New York *Post,* founded as the *Evening Post* in 1801.

For additional information, consult the following articles:

Advertising
Distribution
Freedom of the Press
Linotype
Photo-Engraving
Photography
Printing
Printing Press
Radio
Telegraph

BIOGRAPHY

Bryan, William Jennings
Clemens, Samuel L.
Franklin, Benjamin
Garrison, William
Greeley, Horace
Hearst, William Randolph
Howells, William Dean
Pulitzer, Joseph

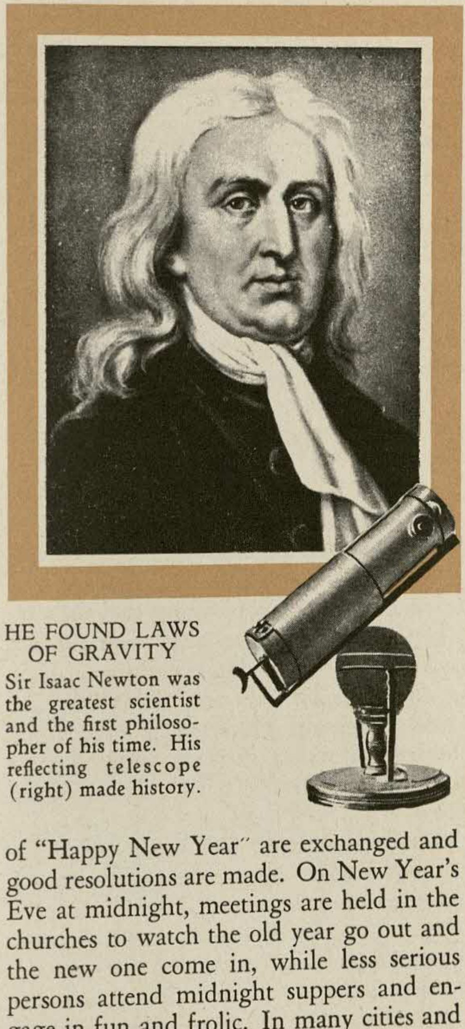
POLKA-DOTTED AMPHIBIAN
A relative of the salamander, the newt is a little amphibian which looks like a lizard. Some people keep newts in aquariums.

NEWT. Starting life in the water, the newt, a small lizard-like animal, passes part of its adult days on land, and then returns to the water to breed and complete its cycle. Though somewhat like a lizard in appearance, it is not a reptile, as is the lizard, but an amphibian (see AMPHIBIANS). Newts and salamanders are tailed amphibians.

The *red-spotted* newt is the best-known American species. On turning over logs in the woods, one frequently finds these small, brightly colored creatures. When they are about two and a half years old, they make a trip to some pond or river, and on reaching the water they go through a great change. Instead of being mostly red, they become mostly brown. They still retain their spots. Their tails become flattened so that they may be of better use in swimming, and instead of breathing the air direct, the animals take it mixed with water. The newts are now mature.

The eggs are about the size of peas and hatch in a little less than a month. During the summer the young newt remains in water, breathing by means of gills. In the fall, it comes out on land and changes into the red form. See SALAMANDER.

NEW'TON, ISAAC, Sir (1642-1727). One of the world's greatest scientists was Sir Isaac Newton, a brilliant English scholar. He contributed some of the basic laws of physics and mathematics, including the law of gravitation, certain laws of light and color, the principles of the refracting telescope, and the binomial theorem. Born in Woolsthorpe, Lincolnshire, he was educated at Trinity College, Cambridge, and later became a professor there. Newton also served as a member of Parliament and as warden of the mint, and in 1703 was elected president of the Royal Society, a position which he held for the rest of his life. He is buried in Westminster Abbey. See GRAVITATION.



HE FOUND LAWS OF GRAVITY

Sir Isaac Newton was the greatest scientist and the first philosopher of his time. His reflecting telescope (right) made history.

NEW YEAR'S DAY.

Ring out the old, ring in the new,
Ring, happy bells, across the snow;
The year is going, let him go;
Ring out the false, ring in the true.

From time immemorial, people have celebrated the first day of the calendar year. Western nations observe the first day of January, while people who use different calendars welcome their new year at different seasons.

In the United States, New Year's Day is a national holiday, a time when greetings of "Happy New Year" are exchanged and good resolutions are made. On New Year's Eve at midnight, meetings are held in the churches to watch the old year go out and the new one come in, while less serious persons attend midnight suppers and engage in fun and frolic. In many cities and towns, bells are rung, whistles are blown, and all kinds of noises are made to mark the moment when the old year dies.

The first day of January, now New Year's Day in almost all countries, was not adopted until late in the sixteenth century as the first day of the year. In Greece and a few other countries, our January 13 is the first day of January and hence of the new year, because of errors in the calendar. In ancient Rome the new year began in March, but was later changed to January 1. In Persia the New Year begins on March 21, and the Jewish New Year is September 23. See CALENDAR; JANUARY.

STATE CAPITOL OF NEW YORK
Imposing is this granite edifice in Albany.

NEW YORK. Were some giant hand to reach down and take away the state of New York, the United States would lose a large part of its financial wealth, much of its commerce, and a considerable portion of its world influence. For, although it touches the Atlantic coast, "the Empire State" is in reality the heart of the nation. Here, where the state shoulders its way to the sea between New Jersey and New England, is the country's largest city—New York, home of Wall Street, the financial capital, and most important gateway for the nation's trade and commerce.

At the southern tip of the state is the finest land-locked harbor in the world. It created the busiest seaport in the United States because it faces Europe, the center of world trade. Stretching northward from this point is the valley of the Hudson River, which joins with the famous Mohawk Valley, thus forming a natural route of trade and travel that gives the state access to the Great Lakes, and consequently to the most productive region in the United States. These two factors are largely responsible for the commanding position of the Empire State. The area is 49,576 square miles.

The Land and Its Features. One of the original thirteen colonies, New York belongs to the Middle Atlantic states. On the south are New Jersey and Pennsylvania, to the west is Lake Erie, to the north are Lake Ontario and the Saint Lawrence River, and on the east are Vermont, Massachusetts, and Connecticut.

On the eastern side of the state, for about two thirds of its length, is the long, narrow valley of the Hudson River, on each side of which the land rises steeply. On the east are the Berkshire Hills and the Green Mountains of New England, and on the west are the picturesque Catskills of legendary fame, and the Adirondack Mountains. The Mohawk River, principal tributary of the Hudson, has its source near Lake Oneida, toward the western boundary, and flows almost directly eastward through the central part of the state. It separates the Adirondacks from the Catskills. These mountains are rather low and contain dense forests that abound in wild life.

Stretching to the west from the Catskills is a great undulating plateau region, with productive soil and numerous lakes and rivers. The plateau slopes northward to the plain region along Lake Ontario. On the western edge this plain is divided into two parts by a limestone escarpment, which forms the famous Niagara Falls. The northern portion of the state, extending from the Mohawk Valley to Lake Champlain and circling the Adirondacks, is low, level land, excellent for farming.

The northern portion of New York is drained for the most part into the Saint Lawrence River, although a few rivers in the extreme northwest flow into Lake Ontario. The Delaware, Susquehanna, and Allegheny rivers rise along the southern part of the state, and the eastern part is drained by the Hudson. There are a number of lakes noted for their scenic beauty, among which are Lake Champlain, Lake George, the Finger Lakes, and Chautauqua and Oneida lakes.

Climate. New York has a wide range of temperature, owing to the extent of the state and the mountain regions. The lands that lie near the ocean and the larger lakes do not have the extremes of temperatures that are found in the inland regions In the mountains the summers are cool and the winters are very cold. The average annual temperature of the state is 47°F., and the yearly rainfall is about forty inches.

Natural Resources. Although New York is well endowed with natural wealth, many other states exceed it in value of mineral resources. The most important mineral products are petroleum and natural gas, found along the Pennsylvania border, and iron ore, found chiefly in the Adirondacks and on the southern shores of Lake Champlain. There are deposits of limestone, sandstone, and marble. In the Hudson River valley and on Long Island there are clay beds, important in the manufacture of brick, tile, and pottery. New York is one of the leading states in the production of Portland cement materials from its quarries, and its salt mines are among the nation's largest. Other valuable minerals include gypsum, talc, soapstone, aluminum, graphite, granite, and feldspar.

Farming in the Empire State. Plentiful rainfall, a moderate climate, and fertile soil have made New York a prosperous farming state. Hay and dairy products are the leading farm products. Dairying has developed because of the demand of near-by cities for milk and butter. Vegetables are raised in large quantities, also, to supply the city markets. In the plateau region of the west, the chief crops are grains, such as oats, corn, wheat; and vegetables and fruits.

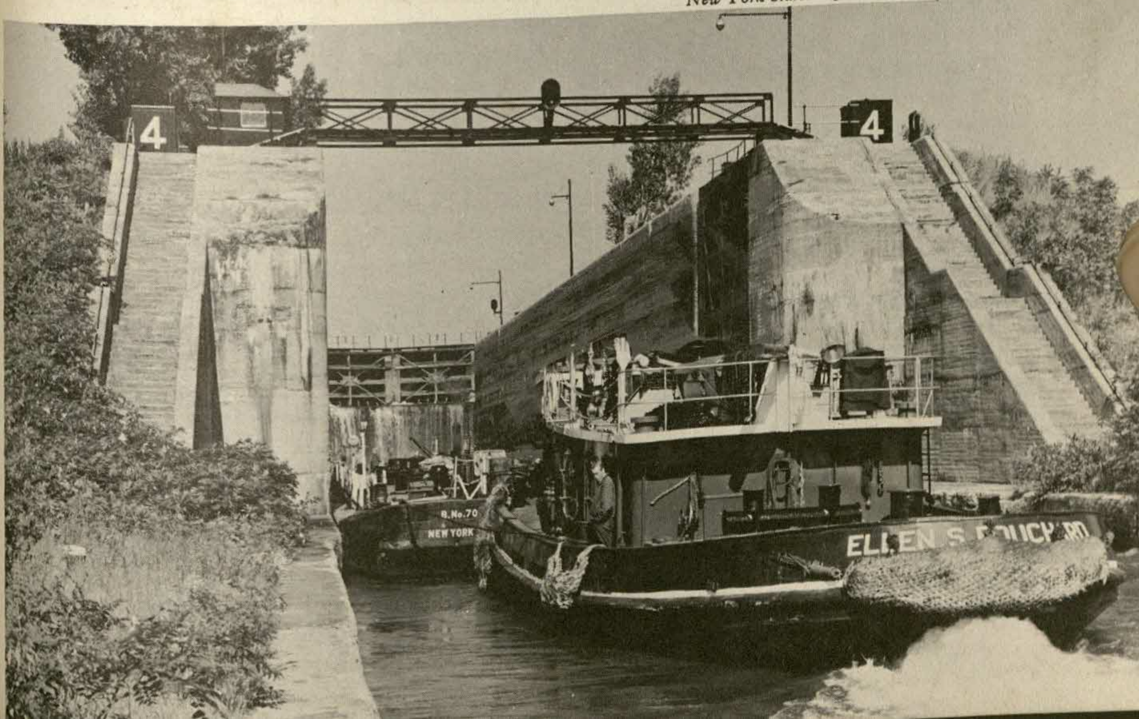
Manufacturing. Because of its geographical location, its excellent transporta-

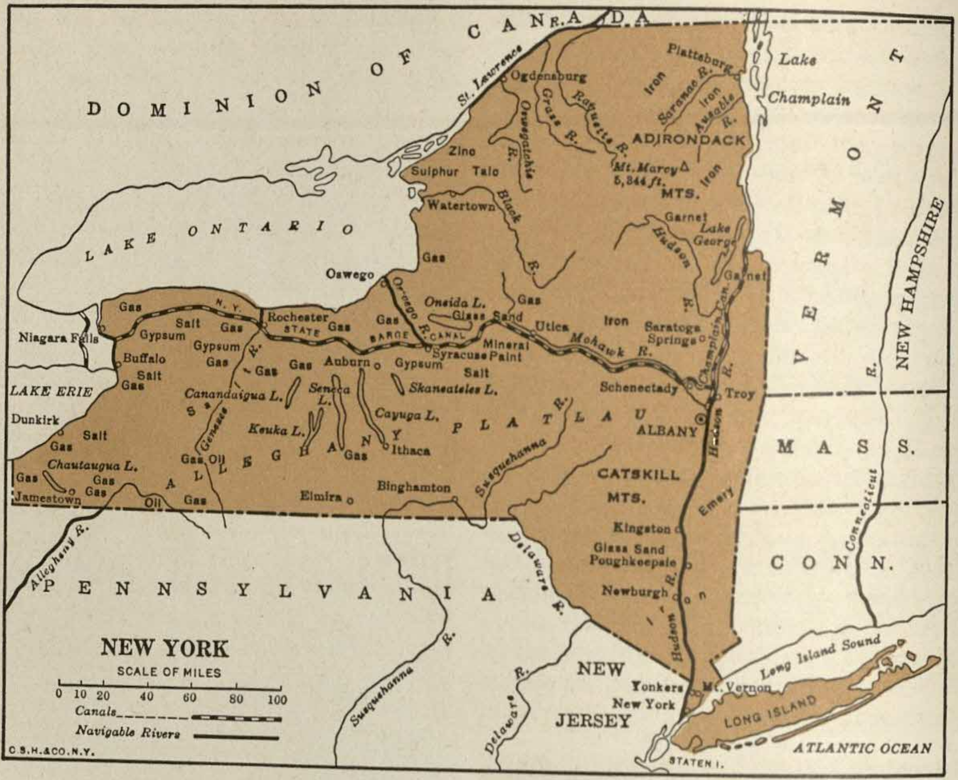
ONWARD AND UPWARD

In the locks of the Erie Canal, below, ships are raised to a higher water level. The ski lift, right, gives summer vacationers birds-eye view of Catskill Mountains.

NYSPIX—Commerce

New York State Department of Public Works





THE EMPIRE STATE—LEADER OF THE NATION

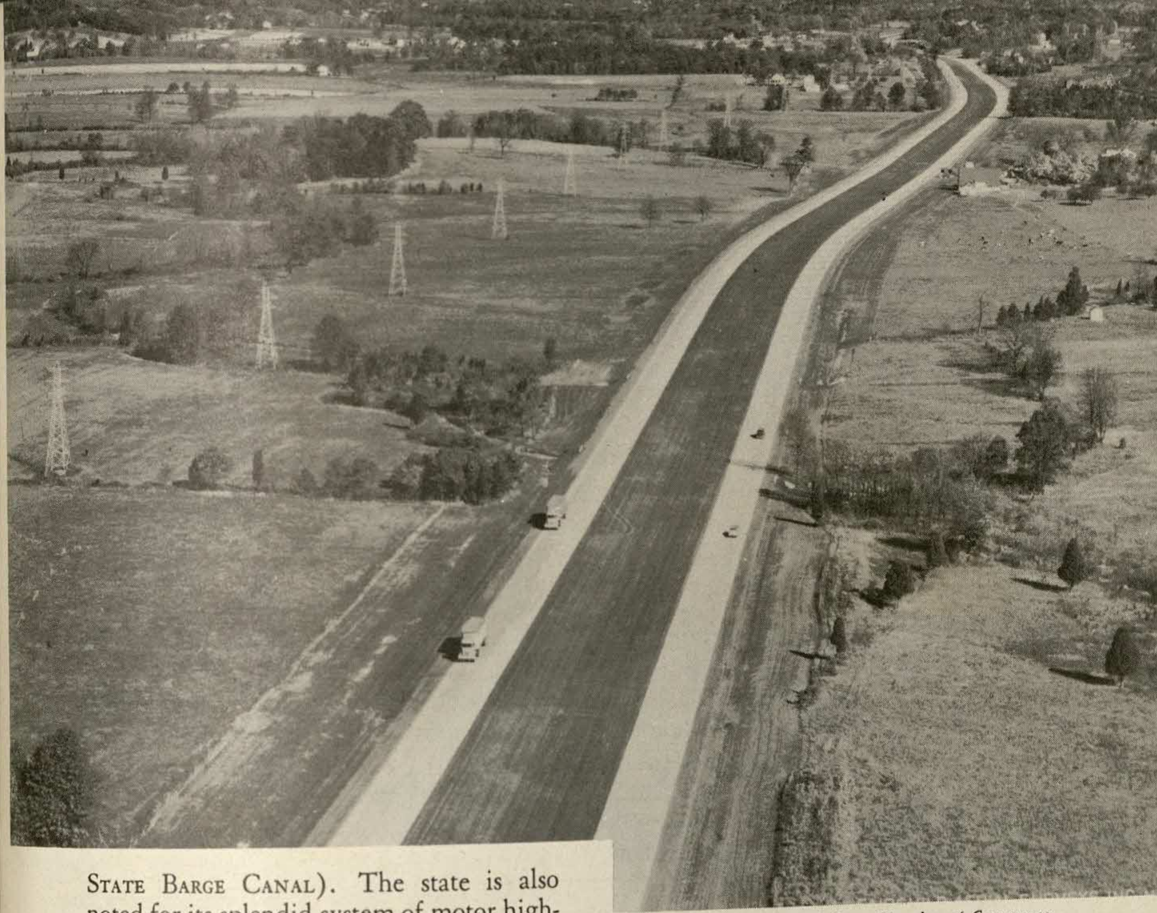
For more than a century, New York has ranked as the foremost manufacturing area of the Western World. It stands first in twenty-seven of the thirty-nine chief industries.

tion facilities by rail and water, and its great store of natural resources, New York has long held the leading place among the states in the amount and variety of its manufacturing industries. The chief manufacturing cities are New York City, Albany, and Buffalo, although there are many smaller industrial centers scattered throughout the state. Leading all other products in amount and value is clothing, which is only one item of a large textile industry in which New York leads all the states. It also ranks first in printing, publishing, and wood-pulp production. Other important items of manufacture include foundry and machine-shop products, boots and shoes, slaughter-house products, steel products, pig iron, chemicals, tobacco goods, flour, and electrical machinery.

Most of the state's heavy industries are located at Buffalo, where large factories obtain their power from Niagara Falls. Here are great steel works and machine-manufacturing plants. There is a considerable lumber industry in the mountain regions, and many canning factories are located in the central part of the state. Troy is the leading center for the manufacture of shirts and collars.

Trade and Transportation. New York ranks first in the states in the value of trade and commerce. Vessels from all over the world come to the harbor of New York City, bringing about two thirds of the imports of the United States.

One of the oldest states in the Union, New York has developed an exceptional system of rail transportation. There are about 8,000 miles of railroads within the state. Important, too, in the transport of commerce, are the inland waterways, including rivers and canals (see NEW YORK



New York State Chamber of Commerce

SEEING NEW YORK FROM ITS THRUWAY

Swift travel on the giant thruway from New York City to Buffalo takes you through rich land used for farms and vineyards.

State Barge Canal). The state is also noted for its splendid system of motor highways.

The People of New York. Because New York receives most of the immigrants of the United States, and because of its great industrial development, it has the largest percentage of foreign-born of any state in the Union. More than fifty per cent of the people live in New York City, while only about sixteen per cent live on farms. The population is about 16,763,000, which exceeds that of any other state. There are a number of large cities in the state, the most important of which are, in order, New York, Buffalo, Rochester, Syracuse, Yonkers, Albany (the capital), and Utica.

Government and Education. The constitution under which New York is now governed was adopted in 1894. The governor and certain other state officers are elected for four years. Some state officers are appointed. In the legislature the members of the house of representatives are elected for two years. Likewise the senators serve two years. The senate has a membership of fifty-eight and the lower house a membership of 150. The court of appeals, at the head of the judiciary, has seven members, each of whom are elected for fourteen years.

There are more students in the educational system of New York than in that of any other state. Children between the ages of seven and sixteen are required to attend school. The state system is headed by a board of regents with thirteen members, all serving for thirteen years. This board is headed by a commissioner who has charge of all state schools. In addition to the regular system, the state maintains a number of normal schools and teacher-training colleges.

Among the larger private institutions of higher learning are Columbia University, Syracuse University, Cornell University at Ithaca, and New York University. The colleges of agriculture, veterinary science, and home economics at Cornell are maintained by the state, and there is a state college of forestry at Syracuse. The United States Military Academy is located at West Point.

History. Henry Hudson discovered and explored the Hudson River in 1609, claiming all the territory for the Dutch government, by whom he was employed. Because they were friendly with the Iroquois Indians, the Dutch were able to establish prosperous fur-trading posts. The first posts were begun in 1614 at Fort Nassau and Fort Orange, within the present site of Albany. The colony of New Netherland was not officially established, however, until 1623, and in the following year a group of colonists under a governor settled at Fort Orange. In 1626 Manhattan Island was purchased from the Indians, and New Amsterdam, now New York City, was established. There were frequent conflicts between the Dutch and the English, and in 1664 the colony of New Netherland became a British possession. The whole territory was then granted to the Duke of York.

Although the colony at first prospered while under the British, it later declined because of harsh government. It had many wars with the Indians and the French. At the outbreak of the Revolutionary War, the Iroquois Indians became allies of the British and were a constant source of danger to the settlements of the state. The colony was also divided internally between the patriots and the Tories. New York threw off the British yoke and organized its own government in 1775, and two years later adopted its first constitution. New York heartily supported the Articles of Confederation, but was one of the last states to ratify the Constitution.

Although New York steadily prospered, its greatest growth came with the opening of the West and the completion of the Erie Canal in 1825. It was then that the products of the West first came to New York instead of being shipped by river to New Orleans. This marked the beginning of the state's great commercial development. New York gave invaluable aid to the Union during the Civil War. Today it ranks as one of the states which have adopted liberal and progressive legislation.

For additional information, consult the following articles:

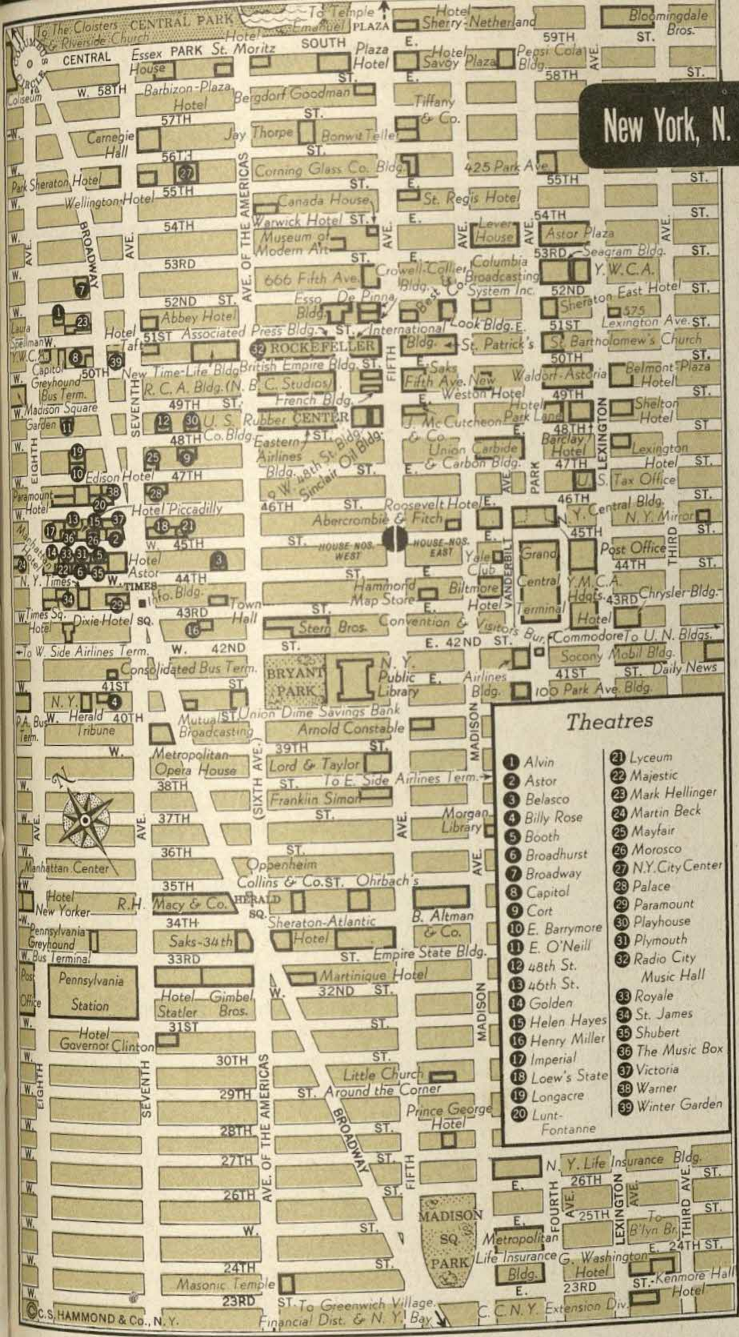
Adirondack Mountains
Albany
Buffalo
Catskill Mountains
Champlain, Lake
Clinton, DeWitt
Erie Canal
Hudson, Henry
Hudson River
Long Island
New York City
Niagara Falls and River
Palisades
Revolutionary War in America
Rochester
Syracuse

NEW YORK CITY. "The Promised Land," New York City has been called, and truly it is the fulfillment of the dreams and ambitions of myriads of Americans and the mecca of fear-driven pilgrims from far-off lands. This seemingly limitless cosmopolitan beehive, second largest city in the world and greatest of seaports, cannot be described adequately in terms of a sky line and a pulsing harbor. Famous as these have become, they are but the visible evidence of a deep-seated spirit of unrest.

To get the best picture of the city, the newcomer must arrive at the front door, through the harbor. Straight ahead is Manhattan Island, with its spirelike buildings rising one above the other. If one is fortunate to see it shining in the sunlight, it appears as a mirage or a fairy city dropped down on a narrow point which pushes out to separate the mouth of the Hudson River, of legendary fame, from the entrance to the East River. To the left, toward the Jersey shore, stands the Statue of Liberty on tiny Liberty Island, and near by is Ellis Island, where Uncle Sam once maintained an immigration station to welcome those he was willing to admit as his own children.

Busy little tugs dart here and there; lazy, loaded scows pull out to sea; heavy freighters carry the corn or the meat of the Middle West across the seas or bring to port coffee

New York, N. Y.



Theatres

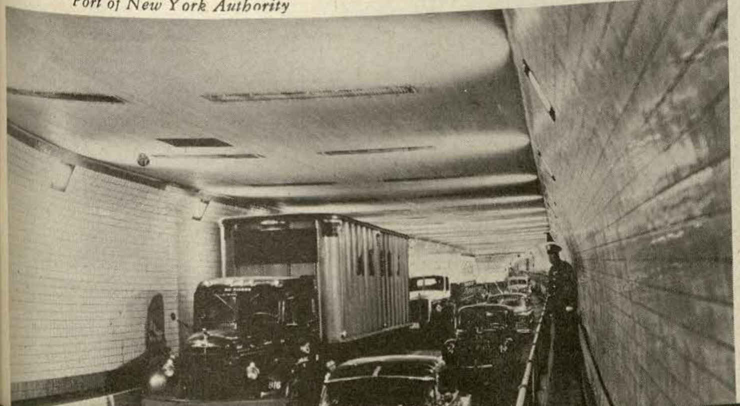
① Alvin
② Astor
③ Belasco
④ Billy Rose
⑤ Booth
⑥ Broadhurst
⑦ Broadway
⑧ Capitol
⑨ Cort
⑩ E. Barrymore
⑪ E. O'Neill
⑫ 48th St.
⑬ 46th St.
⑭ Golden
⑮ Helen Hayes
⑯ Henry Miller
⑰ Imperial
⑱ Loew's State
⑲ Longacre
⑳ Lunt-Fontanne
㉑ Lyceum
㉒ Majestic
㉓ Mark Hellinger
㉔ Martin Beck
㉕ Mayfair
㉖ Morosco
㉗ N.Y. City Center
㉘ Palace
㉙ Paramount
㉚ Playhouse
㉛ Plymouth
㉜ Radio City Music Hall
㉝ Royale
㉞ St. James
㉟ Shubert
㊱ The Music Box
㊲ Victoria
㊳ Warner
㊴ Winter Garden

Copyright C. S. Hammond & Co.

Nyspix-Commerce

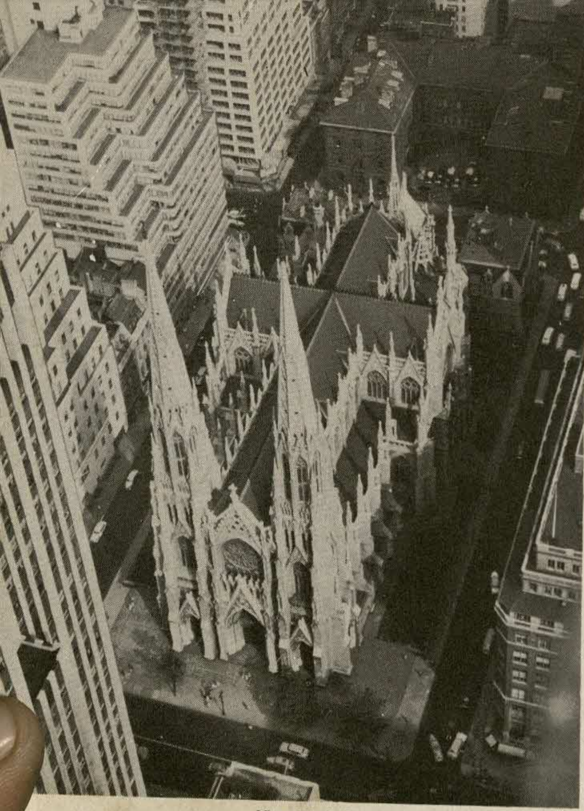
New York Convention & Visitors Bureau

Port of New York Authority



IN THE HEART
OF MANHATTAN

Map of midtown Manhattan includes many of New York City's highlights. Top right, Grant's Tomb attracts thousands of visitors yearly. Above, brilliantly lighted Times Square is the theatrical center of America. Left, Holland Tunnel links Manhattan with New Jersey.



New York State Department of Commerce

VIEW FROM ROCKEFELLER CENTER

The traditional cross-shaped design of St. Patrick's Cathedral shows dramatically from upper floors of a near-by skyscraper.

and tea and luxuries for our table; queenly liners, tourist-laden, are bound for European ports or for the Orient. This indescribable thrill of a water front the traveler enjoys as he enters the harbor from the ocean, or as he leisurely makes his way through the maze of craft on a friendly ferry.

Landing on Manhattan, he will quickly be in the midst of man's greatest achievements in the fields of science and engineering; for here are some of the finest examples of modern bridge building, numerous tunnels cut through the solid rock on which the city is built, and the tallest structures in the world; one, the Empire State Building, towers 1,472 feet above the street. He will also find himself in the midst of the noisy confusion of the pushing, hurrying, milling thousands of New Yorkers, whether by day or night. However, there is purposefulness and intentness about this activity which is contagious, and the one who catches the beat quickly feels himself an important part of this great city.

Geography of the City. Five boroughs — Manhattan, Bronx, Brooklyn, Queens, and Richmond—comprise New York City. Its population of 7,737,000 is more than twice that of any other city in the United States. Including suburbs in New York, New Jersey, and Connecticut, New York City's population rivals that of Greater London or Greater Tokyo. The city's area of 359.4 square miles is exceeded in the United States only by Los Angeles' 452 square miles.

The nucleus of the city, Manhattan Borough, is coextensive with Manhattan Island. From the tip of the Battery, at the south, to Spuyten Duyvil Creek and Harlem Ship Canal, at the north, this densely populated borough extends about thirteen miles. At its widest part it extends but two and one-half miles from east to west, and within its twenty-two square miles live about 1,995,000 persons. Manhattan is separated from New Jersey, on the west, by the Hudson River, still locally called the North River; in colonial days the Hudson was thus distinguished from the Delaware, or South, River.

To the north and northeast of Manhattan is the borough of the Bronx, the two boroughs being separated by the Harlem River and Ship Canal. On Long Island are Queens and Brooklyn boroughs, which are separated from Manhattan by the East River, an arm of Long Island Sound. In the harbor, to the southwest, is Staten Island, comprising the borough of Richmond.

Also within the limits of Greater New York are several smaller islands, including Welfare, Wards, Randalls, and Governors. Bedloe, or Liberty, Island and Ellis Island, in Upper New York Bay, are owned by the United States government. They are geographically within the boundaries of New Jersey, but are always associated with New York; Ellis Island is the receiving station of the immigrant seeking to enter the city, and from afar he sees the Statue of Liberty, on Bedloe Island, bidding him welcome to the New World.

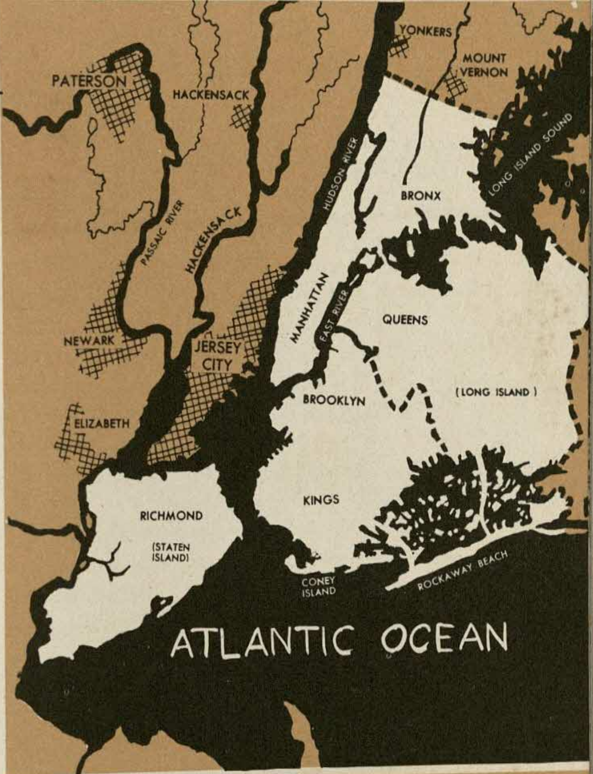
Streets, Parks, and Monuments. The best-known street in New York is Broadway, which stretches the entire length of Manhattan Island. It starts at the southern end of the island and heads north, but part way up it cuts diagonally across the city and progresses up the west side. Commercial buildings line lower Broadway. Farther north on Broadway is the section world famous as the "Great White Way," the theatrical center of the city; in fact, it is the theatrical center of the country, for Broadway successes are the ambition of playwrights, actors, producers, and all others connected with the theater. Times Square, at Forty-second Street and Broadway, is the busiest and most crowded place imaginable.

Wall Street, at the southern end of Manhattan, is the financial center of the Western World. For all its fame, it is but a short street of a few blocks. Other well-known thoroughfares are Fifth Avenue, noted for its shops, clubs, and hotels; beautiful Riverside Drive, which follows the Hudson River; fashionable Park Avenue; Harlem Speedway; and the Grand Concourse.

Many parks and squares serve as recreation grounds for the people of the city. The largest and best known is Central Park, noted for its gardens, walks, lagoons, and zoölogical gardens. Other parks are Battery Park, Bronx Park, Van Cortlandt Park, and Pelham Bay Park. Coney Island, at the ocean end of Brooklyn, is a popular bathing beach and amusement park.

Throughout New York are many famous statues and monuments, some of which are located in the parks. In Central Park is the famous Egyptian obelisk, Cleopatra's Needle. Outstanding for its imposing setting is Grant's Tomb, overlooking the Hudson River. The Soldiers' and Sailors' Memorial Arch is in Brooklyn.

Buildings and Institutions. Outstanding in the city's sky line are the towering Empire State Building, 102 stories high; the R. C. A. Building, seventy stories high, a part of the mammoth Rockefeller Center development; and the Chrysler Building, seventy-seven stories high. Some of the older buildings are the City Hall, the Public Library, the Criminal Courts Building, the city prison (called the Tombs), the Pennsylvania Railroad Station, and the Grand Central Terminal.



NEW YORK, CAPITAL OF THE WORLD
New York City is divided into five political sections called boroughs. The largest is Queens borough. Others are Brooklyn, the Bronx, Manhattan, and Richmond.

Among the many well-known churches in New York City is Trinity Church, one of the oldest, which, with its quaint old burying ground, stands at the head of Wall Street. Others include the Cathedral of Saint John the Divine; Saint Paul's Chapel; Saint Patrick's Cathedral; Riverside Church; and the Church of the Transfiguration, beloved by thousands as the "Little Church Around the Corner."

New York has some of the finest colleges and universities in the United States. They include Columbia University (founded as King's College in 1754), New York University, the College of the City of New York, Hunter College, Columbia-Presbyterian Medical Center, and Fordham University. The city also boasts a number of large libraries.

The music center of the United States, New York is the home of the Metropolitan Opera Company and the New York Philharmonic Society, which gives concerts in Carnegie Hall. It is the dream of singers all over the world to sing at the old Metropolitan Opera House.

The city is also the literary and art center of the country. Most of the fine artists and writers of the United States, as well as many from other countries, make New York their headquarters.

The Metropolitan Museum of Art is world famous. Here may be seen the most valuable art collection in the United States. Other outstanding museums are the American Museum of Natural History, the Museum of the American Indian, the Museum of the American Numismatic Society, and museums of the Hispanic Society of America and the New York Historical Society.

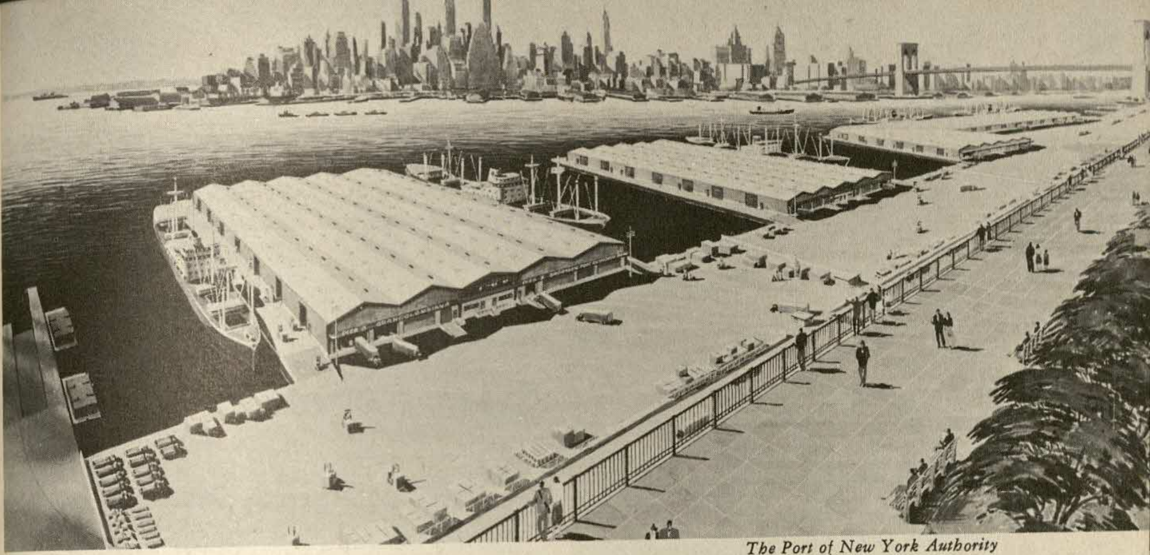
Transportation and Commerce. The street-car lines are rapidly disappearing from Manhattan, and the elevated lines have gradually been eliminated. A very large part of local transportation is provided by the subway lines which the city owns and operates. The trend has been toward elimination of surface lines and the construction of modern highways for automobiles and buses. Manhattan is connected with the rest of the city by the Brooklyn, Manhattan, Queensborough, Williamsburgh, and Triborough bridges. Transportation across the rivers is also provided by ferry lines and tunnels, including the Holland and Lincoln and Brooklyn-Battery vehicular tunnels.

New York is the largest seaport in the world, and about half of the foreign commerce of the United States passes through this port. The shores of Manhattan Island are lined with docks and wharves of the largest steamship lines in the world. Airport facilities are outstanding.

Industry and Government. No other city in the United States equals New York in the extent and value of its manufacturing industry. New York is the center of a vast industrial area which includes Westchester County and six counties in New Jersey. In the city are about 38,000 manufacturing establishments, employing almost a million workers. Printing and publishing and the manufacture of clothing are leading industries.

TAKING FLIGHT
New York City has many excellent, up-to-date airport facilities for local, continental, and international flights. The New York International Airport is one of the major crossroads of the world. It serves passengers departing for and arriving from all parts of the world.

The Port of New York Authority



The Port of New York Authority

SKYLINE AND WATERLINE

New York City is the largest seaport in the world, and most American export and import goods pass through its docks. Its shores are lined with wharves and piers of the largest steamship lines in the world. At the Fulton Terminal Area of the Brooklyn-Port Authority piers, modern pier construction allows an unobstructed view of the harbor and skyline.

The head of the city government is the mayor, who holds office for four years. Each of the five boroughs has a president, who also holds office for four years and is in charge of the various administrative bodies. The government of each borough is under the general supervision of the mayor. Under a charter adopted in 1936, the former board of aldermen, consisting of members elected by districts, was replaced by a city council chosen by proportional representation.

The council has legislative powers for the city, and the board of estimate exercises administrative powers, besides concurring in legislation of importance.

History. Although Henry Hudson is credited with the discovery of the Hudson River and surrounding region in 1609, the first white man to explore Manhattan Island was Giovanni da Verrazano, in 1524. After Hudson's explorations, however, the Dutch started to trade with the Indians, but did not make a serious attempt to found a settlement until 1624, when a small company of colonists established themselves at Fort Orange, the present site of Albany. In 1626 a small group under Peter Minuit began a settlement on Manhattan Island, which they bought from the Indians for about twenty-four dollars.

The village was named New Amsterdam. It enjoyed immediate prosperity and in 1653 was incorporated as a city. In 1664 the Duke of York, under grant from the king of England, sent Colonel Richard Nicolls to claim the territory occupied by the Dutch. He took over the city and named it New York.

During the eighteenth century New York came to be the most important center in the colonies. It was the meeting place of the Continental Congress from 1785 to 1790 and was the scene of George Washington's inauguration. Although New York continued to grow in prosperity and importance, it was not until the construction of the Erie Canal that it began to be looked upon as the commercial center of the United States. Greater New York was organized in 1898, within its present limits; and from that time on, the city has remained the financial, commercial, and industrial center of the nation. See LIBERTY, STATUE OF; METROPOLITAN MUSEUM OF ART; NEW YORK.

NEW YORK STATE BARGE CANAL. Unification and improvement of the Erie, Cayuga, Seneca, Oswego, and Champlain canals have given New York state a great system of connected inland waterways.

In 1903 the state authorized a bond issue of $101,000,000 to canalize 350 miles of lakes and connecting rivers and to provide nearly 450 miles of new construction or improvement in the existing waterways named above. The total length of the system is now 525 miles. Work was begun in 1907, and since that time the total expenditure for construction, terminals, grain elevators, repairs, maintenance, operation, etc., has reached more than $315,000,000. It is said that in nearly one half the area of the state, no point is more than twenty-four miles from the canal system.

The channel of the unified canal is not less than twelve feet deep; in width it varies from 125 feet in soft-earth sections to ninety-four feet through rock-cut routes. There are fifty-seven locks, each 328 feet in length and forty-five feet in width, capable of passing vessels ranging in tonnage from 1,500 to 3,000. On the Erie Canal the locks number thirty-five, on the Cayuga and Seneca, four, on the Oswego, seven, and on the Champlain, eleven. See CANAL.

NEW ZEALAND, *ze'land,* DOMINION OF. Lying lonely and isolated in the vast stretches of the blue South Pacific Ocean are two large mountainous islands and several smaller ones that together form the Dominion of New Zealand, a member of the British Commonwealth of Nations. It lies in about the same latitude south of the equator as do Spain, Italy, and Southern France north of the equator, and in its climate and its agriculture it resembles those countries.

Large, modern cities, fine railroads, highways, and flourishing farms are characteristic of this progressive country. Progress has come in spite of the handicap of great distance from other civilized nations. Australia lies closest to these islands, but more than 1,200 miles of ocean separate the two areas. The United States lies more than 6,000 miles away; while London, the heart of the British Commonwealth of Nations, is about 12,000 miles distant, or halfway around the world.

Richard Harrington, Canada

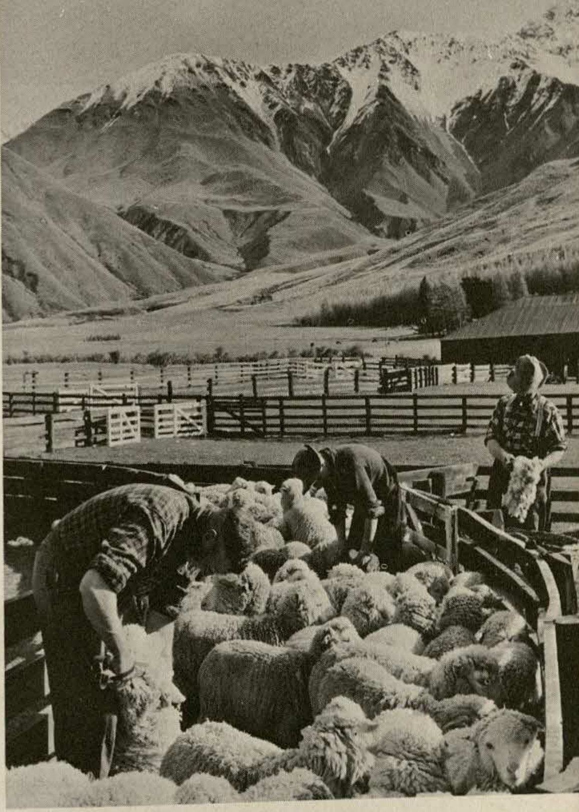
BOILED EGG ALA NEW ZEALAND
Maori girl cooks lunch over a hot spring.

New Zealand is somewhat similar to Italy in shape, but the foot is separated from the leg of the boot and the whole is upside down. In addition to North Island and South Island, there are a number of smaller islands, which combined give the Dominion a total area of 103,736 square miles.

The Surface of the Land. Authorities do not agree as to the origin of these two big islands. It is certain that they were not a part of Australia in any recent ages, and it is thought that they are the remains of a huge mountain range in the Pacific. Even North Island and South Island, separated by the Cook Strait, ninety miles wide, have little in common. North Island is of volcanic origin and still has active craters; while South Island has glaciers and Alpine mountains rivaling those of Switzerland. However, the general character of each is mountainous.

South Island is the more rugged of the two, its Southern Alps extending along

National Publicity Studios, Wellington, N.Z.



NEW ZEALAND'S VARIED LIFE

Above, Queen Street, main shopping street in Auckland, New Zealand, resembles those in many other large cities. Right, Merino yearlings on Canterbury Plain are eye-clipped so that they can see to graze. Mutton, lamb, and wool are the islands' principal exports.

almost the entire west coast. A number of peaks in this range reach a height of more than 10,000 feet. These mountains are forest-covered and there are many beautiful glaciers, the largest of which is the Tasman, more than eighteen miles long. North Island consists chiefly of forested hills and plateaus, with several isolated volcanic peaks, each more than 7,000 feet in altitude.

The north peninsula of North Island is beautiful, with its semi-tropical vegetation, but it is not extensively productive. There are plains and fertile valleys between the mountain ranges and particularly along the eastern coastal region of both islands. There are numerous short and swiftly flowing rivers in New Zealand, several of which are being developed to produce hydroelectric power.

Climate. The climate of the islands is generally mild and pleasant, although influenced somewhat by cyclonic disturbances that move eastward across the ocean. The moisture-bearing winds of the South Pacific bring plentiful rainfall to all parts of the Dominion. The precipitation is heavy on the western side of the mountains, reaching 116.5 inches a year. The average for the whole region is between forty and fifty inches.

Wealth of the Land. New Zealand is well endowed with natural resources, the greatest being the widespread grazing lands. Coal is found to a considerable extent in many places, although it is less abundant on North Island than on South Island. Deposits of gold have been discovered on both islands, chiefly in the river beds. There is also some platinum, silver, copper, manganese, and iron. The mountains are densely forested, and many of the trees are of great commercial value. An important forest product is the gum of the kauri pine.

Farming in New Zealand. The most important agricultural enterprise is the raising of livestock, for the islands are primarily a grazing country. Because of the mild climate, the animals can be left out at all seasons of the year. This advantage, together with natural grass-covered plains, enables the farmer to raise livestock at much less cost than in other countries. Sheep and cattle are the most important farm animals, and wool, hides, meat, and dairy products are the principal exports of the country. The leading crops are oats, wheat, and barley. There is a considerable production of vegetables, and in the warmer parts of the Dominion, fruits are raised extensively.

Manufactures. The most important manufacturing development of New Zealand centers around the dairy industry. The chief products are butter, cheese, and milk. There are also a number of meat-packing plants and tanneries, sawmills, and lumber mills.

The People. The original inhabitants of New Zealand were Polynesians, the ancestors of the present natives, the Maoris. The Maoris have successfully adjusted their own civilization to that of the whites, who make up the greatest part of the country's population. Although their numbers are few, the Maoris are important in the life of New Zealand. Many of them own land and stock and have adopted European dress and customs. Some hold government positions. In the total population of about 2,316,000, the Maoris number about 152,000, and they are increasing.

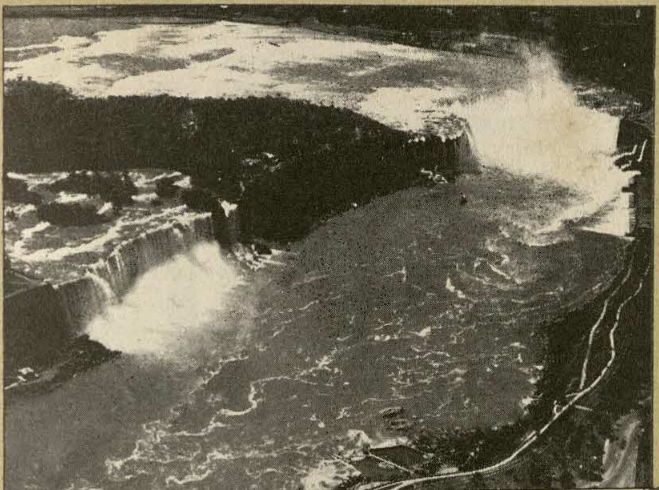
Government and Education. School attendance is required in New Zealand for all children from the ages of seven to fifteen, and state schools are free for all those who wish to attend to the age of nineteen. The Minister of Education controls the educational system. There are excellent opportunities for university training at very low cost to the student. The University of New Zealand is at the head of the system. It is comprised of the following institutions: Auckland University College, Otago University, Canterbury University College, and Victoria University College. There are also several professional schools.

As in all British Dominions, the head of the government is the Governor-General, who represents the king. There is also a ministry which assists the Governor-General in administrative work. The legislative branch of the government consists of a Council and a House of Representatives. The capital is Wellington, located on North Island. Other large cities include Auckland, Christchurch, and Dunedin.

History. New Zealand was first seen in 1642 by Abel Tasman, a Dutchman. However, three centuries before, it had been discovered by the Polynesians. It was not until Captain Cook visited it in 1769 that the country became widely known. Missionaries made the first settlements in 1814. During the early nineteenth century, both France and England tried to get control of the islands. New Zealand became British territory in 1840 through a treaty with the Maoris. In 1852 the colony was granted the right of self-government. It received the designation Dominion of New Zealand in 1907. New Zealand is noted for its liberal social and political laws. The Dominion supported Great Britain in the First and Second World Wars. It was at war with Japan from 1941 to 1945.

NEY, *nay,* MICHAEL, Duke of Elchingen, Prince of the Moskva (1769-1815). Ever faithful to Napoleon, Marshal Ney was the emperor's most trusted general. He joined the French army when he was nineteen years old, serving through the Revolution in the Rhine campaign and rising to the rank of general. When Napoleon came to power, Ney's progress was unimpeded, and he distinguished himself at Elchingen, Jena, Eylau, and Friedland. As Napoleon's star rose, so did Ney's, and honors were showered upon him. In the Moscow retreat he was in charge of the rear guard, and he proved his ability again at Lützen, Bautzen, and Dresden.

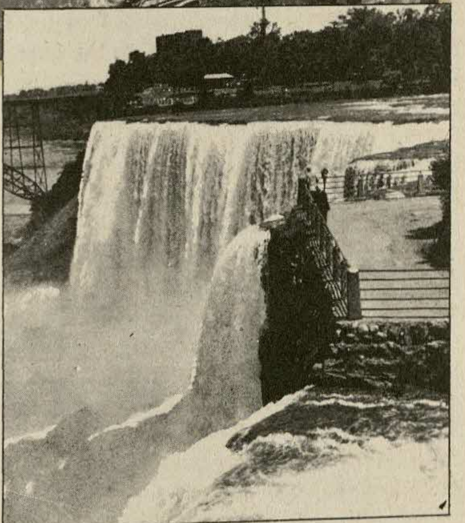
Ney stayed in France when Napoleon first abdicated, but he forsook Louis XVIII when Napoleon returned to regain his empire. Rejoining his commander, he enabled Napoleon to enter Paris, but he was unable to stem the Allies at Waterloo. He attempted to flee after that defeat, but was captured and executed in Paris.



A CATARACT OF ROARING POWER
The awesome spectacle of mighty Niagara Falls attracts travelers from all the world: 120 million gallons of water rush over the lofty brink every minute, generate much power.

NIA'GARA FALLS AND RIVER. Over the mighty Niagara Falls, one of the world's greatest cataracts, plunge the waters of Lake Erie on their way to the sea. The Niagara River, international boundary between Ontario and New York, is like a great funnel into which that lake empties. For thirty-three miles it flows calmly northward, then hastens along ever more swiftly, and suddenly spills into Lake Ontario, leaping from the overhanging shelf of rock at the crest of the Falls, then seething and churning through a narrow gorge. The river drops 315 feet in its brief length. The Falls themselves drop half that distance. They are not high as compared with the lofty Victoria Falls in Africa, but they pour the tremendous volume of nearly half a million tons of water into their basin every minute.

Goat Island separates the Falls into the Horseshoe, or Canadian, Falls on the west, and the American Falls on the east. The former, with a 2,950-foot curving front, carry most of the water and drop 158 feet; the American Falls are 167 feet high, with a 1,400-foot curving front, and carry only about one tenth of the total volume. Just above the Falls is a rapids in which the river drops fifty-two feet in a mile.



The river runs over a bed of hard limestone, beneath which are layers of softer rock. The rock is gradually wearing away; a vast chunk toppled from the face of the Falls in 1937. Geologists, by measuring the rate at which the water is wearing away the rock and by measuring the length of the gorge, are able to calculate the approximate period elapsing since the last great glacier withdrew from this area and allowed the waters to run north. Because the soft rock wears away faster than the top rock and because of the tremendous outward leap of the water, great "caves" have been left underneath the lip of the

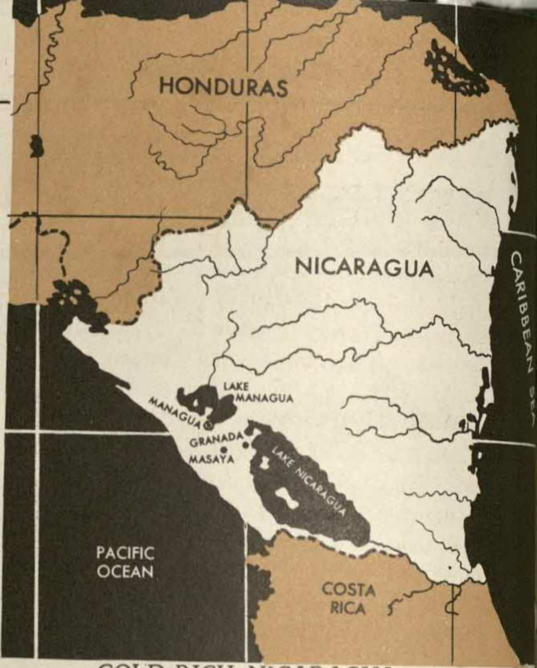
Falls, into which tourists can walk for a thrilling view. There are spectacular viewpoints at the brink of the Falls on each side, and other impressive views are visible from sightseeing boats in the basin below.

One of the most famous natural wonders in America, the Falls are visited by thousands of tourists every year. Parks owned by the state of New York and by the Canadian government flank the cataract, an aerial cable car provides a thrilling ride at the Whirlpool, where the gorge makes a sudden bend, and railway passengers catch a view of the gorge as they cross the Michigan Central Bridge or that of the Canadian National Railways. Another bridge for pedestrians and vehicles toppled into the gorge in January, 1938, its steel web crushed by a massive ice jam. An electric railway follows the gorge down to near Lewiston.

Part of Niagara's water is diverted before it reaches the Falls, to run through underground tunnels into power houses where electrical energy is developed by giant turbines. About 10,000,000,000 kilowatt hours of power are produced yearly, 6,000,000,000 by Canadian plants, 4,000,000,000 by United States plants. In 1950 the two countries agreed to raise power production to 23,000,000,000 k.w.h. yearly by reducing the flow of about 170,000 cubic feet a second over the dam and sharing the diverted water equally. The flow is to be cut to 100,000 cubic feet a second during the visiting months and to 50,000 cubic feet a second at night and in winter.

Ships passing between Lake Erie and Lake Ontario navigate the Welland Canal, parallel to the river in Ontario. See Glacial Period; Great Lakes, The; Welland Canal.

NICARAGUA, *nik a raw′ gwah.* Stretching across the center of Central America, to the south of Honduras, is the Republic of Nicaragua. Mountainous and tropical, the country has a wealth of natural resources. With an area of about 57,143 square miles, it is the largest of the Central American states. Constantly troubled by internal strife which has tended to retard its development, Nicaragua awaits only an era of peace to come into its own. An interesting and beautiful country, it has wonderful scenery, with broad plains, magnificent mountains, and turbulent streams. Part of its appeal lies in the fact that many of its buildings and customs have remained unchanged through the centuries.



GOLD-RICH NICARAGUA

Nicaragua is the largest of the Central American countries. Its mountains give us gold.

The Land and Its People. Nicaragua lies between the Pacific Ocean and the Caribbean Sea. Extending through the country from north to south are two mountain ranges. To the east, low mountain spurs, separated by valleys, slope down to the low, flat, coastal lands of the Caribbean. On the western side of the mountains, the land is low and dotted with several lakes, the largest of which are Nicaragua and Managua. The San Juan River drains these two lakes into the Caribbean. The longest river is the Coco, or Segovia. The other rivers are short and not navigable.

Most of the people live in the western part of the country, for there the rainfall is moderate as compared with that of the eastern coast; the climate, although tropical, is agreeable; and the soil is fertile. The largest city is Managua, the capital, with a population of about 177,000. The total population of the country is about 1,378,000, composed largely of the native Indians and mixed Spanish and Indians. The Mosquito and Zambo Indians and some Negroes live in the eastern sections, and many Spanish people live in the western part of the country.

Natural Resources. The agricultural wealth of Nicaragua consists of beans, coffee, bananas, cacao beans, cotton, sugar cane, corn, coconuts, and rice. Bananas and coffee are the chief crops in point of value. These crops are not the only source of wealth, for there are large supplies of mahogany and other cabinet woods in the forests, and the hills are rich in gold and silver, while on the upland plains there are excellent pastures for cattle.

Commerce and Government. Nicaragua has an extensive foreign trade, which is carried on chiefly with the United States. More than half the country's exports are bought by the United States, which in turn supplies nearly three fourths of the imports. The chief ports of Nicaragua are Bluefields on the Caribbean, and San Juan del Sur on the Pacific.

The President of Nicaragua is elected for a term of six years. The legislative branch of the government is composed of a two-house Congress; members of the Senate are elected for six years, and members of the Chamber of Deputies for six.

NICARAGUA CANAL. Long before the Panama Canal was built, engineers were planning a canal across Nicaragua to link the Atlantic and the Pacific oceans. Under the Bryan-Chamorro Treaty of 1916, the United States holds the perpetual right to construct a canal over any desired route and to establish necessary naval bases. In recent years the movement to build this canal has gained new headway, for the reason that the traffic on the Panama Canal is constantly growing, and because of the threats of war and the international-armaments race between the nations of the world.

According to a survey, the proposed Nicaraguan Canal would take about ten years to build. The most probable route would begin at Greytown on the Caribbean Sea and follow the Deseado River for a short distance, then cut across to the valley of the San Juan River, which it would follow to Lake Nicaragua. It would cross the lake, then cut across a narrow neck of land to Brito, on the Pacific Ocean. This canal would cost an estimated $722,000,000. Three locks would be required at each end.

As long ago as 1849, a company headed by Cornelius Vanderbilt was granted the right to build a canal along this route. After forty years of inaction, a commission was formed in 1889; ten years later, still another commission was authorized to study the practicability of the project. The report was favorable, but before arrangements could be made, the Panama Canal Company of France sold its right to the United States in 1902, and work was begun on the Panama Canal. See PANAMA CANAL.

NICHOLAS, SAINT. In the early days of the Christian Church there lived a kindly and saintly giver of gifts who, in the days of the Emperor Diocletian, was persecuted for his faith. This man was the Bishop of Myra in Asia Minor. Later he became known as Saint Nicholas. He was the patron saint of Russia and also the protector of children. His feast day, December 6, is still celebrated in some places. Because this day is close to Christmas, his name came to be associated with that holiday. The familiar "Santa Claus" comes from the Dutch "San Nicholaas," introduced into America by the early Dutch colonists.

NICHOLAS, *nik'o las,* **II** (1868-1918). The last of the Russian czars, Nicholas, once called "Little Father" by his people, ruled from 1894 to March 15, 1917, when he was deposed by the revolution. Nicholas was not a strong ruler and, although he had some liberal tendencies, he was easily swayed by short-sighted advisers.

The ill-fated czar was the eldest son of

Czar Alexander III. In 1894, the year of his accession, he married Princess Alexandra of Hesse, who despised the Russians. His father had maintained a very autocratic rule, but Nicholas did not have the personal force to continue to rule in the same manner. To his credit, however, is his leadership in calling the first International Peace Conference at The Hague, which brought about the formation of the Permanent Court of Arbitration.

Although Nicholas was a friend of peace, his country became involved in a war with Japan in 1905, and it was drawn into the First World War in 1914. Intrigue and corruption in the royal government during the struggle fomented the revolutionary activity which had been growing since the turn of the century, and by 1917 it reached a climax. During the first revolt, members of the imperial family were held prisoners in the palace, but during the second revolution of that year they were sent to Siberia. In July, 1918, Nicholas, the czarina, and their five children were put to death by the Communist commissar at Ekaterinburg. See PEACE CONFERENCE, INTERNATIONAL; RUSSIA; WORLD WAR I.

NICKEL, *nik'l.* This white, magnetic, metallic element is hard but malleable, and capable of taking a high polish. It does not tarnish readily in air; hence many common metals like iron are nickel-plated. It is 8.9 times as heavy as water. Since it is not attacked by melted alkalies, crucibles for laboratory use are made from it. Nitric acid will readily dissolve it. It has some use in alloys, such as nickel steel, monel metal, German silver, and coinage metals.

The "nickel" (five-cent piece) used in the United States, although it resembles nickel in color, is really seventy-five per cent copper and only twenty-five per cent nickel. The Edison storage battery uses nickelic hydroxide and iron dust as its poles, which are placed in a solution of potassium hydroxide with a strength of twenty-one per cent.

Canada is the chief source of the world's supply of nickel. The chemical symbol of nickel is *Ni.*

NICOBAR, *nik o bahr',* **ISLANDS.** Lying in the Bay of Bengal is a group of tropical islands of coral and mountainous formation, known as the Nicobars. Nineteen islands make up the group, having a total area of 635 square miles; only twelve islands, however, are inhabited. Situated between the Andaman Islands and Sumatra, they make up a part of the British province of Andaman-Nicobar. White men find it difficult to live there, for the climate is hot and damp. The islands have large forests of fruit and timber trees, but coconuts are the chief article of trade. In recent years the Nicobars have become important as an air base in the Bay of Bengal. They have a population of about 12,500.

NICOTINE, *nik'o teen,* or *nik'o tin.* Less than one drop of the concentrated alkaloid, nicotine, would kill a man in a few minutes. Nicotine is a colorless, oily liquid of strong odor and taste. It is found, with other alkaloids, in the leaves, roots, and seeds of the tobacco plant. In solution, it is a popular insecticide. It has been established that nicotine is absorbed in the process of smoking and that the drug can raise the blood pressure and have harmful effects on the heart and the digestion. Tars in tobacco are also harmful, irritating the respiratory passages. The smoking habit is not recommended to young people. See TOBACCO.

NIFLHEIM, *nif'l'hime.* Ruled over by the goddess Hel, Niflheim was a place of intense cold and everlasting darkness, according to Scandinavian mythology. The wicked, as well as those who died of old age or sickness, were cast into this region.

NIGER, *ni'jur.* The largest river in West Africa is the Niger. Rising in the mountainous frontier of Sierra Leone only 150 miles from the sea, it flows northeastward into the interior for about half its course of 2,600 miles, and then swings southeastward to the Gulf of Guinea.

Through its fertile delta, more than 150 miles wide, it has cut a number of channels, only one of which is navigable.

The Niger has a number of names, such as Joliba in its upper reaches, Issa and Mayo in its middle course, and Kwara in the delta region.

The Niger is often called the French Nile, because of the benefits it brings to the territory along its banks. Between three and four hundred miles from its source it enters a rich productive territory where, because of islands in its channel, it spreads over a wide region in the form of several small streams. Farther along it enters a narrow gorge which opens into a desert region below Timbuktu, and it then passes into a densely populated area extending to the mouth. Its greatest tributary is the Benue. The Niger is exceeded in size only by the Congo and the Nile in Africa. See CONGO RIVER; NILE.

NI′GER, *ni′ jer,* REPUBLIC OF, is a country formed from inner French West Africa. It is bounded by the republics of Dahomey and Upper Volta, Sudanese Republic, Algeria, Libya, Republic of Chad, and Nigeria. It became independent August 3, 1960. Its area is 494,500 square miles, and its population is about 2,415,000. Its capital is Niamey. It had been self-governing since 1958.

NIGERIA, *ni jer′ ih ah,* FEDERATION OF, is a country of Africa on the Gulf of Guinea. It is bounded by the republics of Dahomey, Niger, Chad, Cameroon, and the British trusteeship of Cameroons. It is a federation of three regions, Northern, Western, and Eastern Nigeria. Nigeria has an area of 373,250 square miles, and about 34,000,000 residents. Its capital and largest port is Lagos. Ibadan, its largest city, has 500,000 residents.

The climate varies from hot and humid in the south to subtropical in the north. The Niger is the important river. Nigeria's fertile soil produces cacao, peanuts, cotton, rubber, maize, yams, and fruits. There are deposits of tin and coal. Great Britain obtained Nigeria by cession of the king in 1861. It became independent October 1, 1960. British Cameroons had been administered with Nigeria.

NIGHT′HAWK. This twilight-loving bird belongs to the goatsucker family and is a relative of the whippoorwill. Few sights are so interesting to the country child as that of a nighthawk mounting into the sky. It makes a few rapid strokes of the wings, then soars a bit, utters a sharp nasal cry, and strokes again. Up and up it goes, until, deciding it is high enough, it sets its wings and dives head foremost toward the earth. But after descending, often a considerable distance, it turns sharply, and the watcher hears a curious booming sound as the air rushes through its wings. Then it begins the upward flight again to repeat its performance of "sky coasting."

The common nighthawk, which is known also as the *bull bat,* the *mosquito hawk,* and by other local names, is nine or ten inches long. It is of a mixed black and gray color, with a white throat patch and a large white spot on each wing.

NIGHT HERON. A species of wading bird marked with black on the head and neck, ash-gray in color above and white below, the American variety of the night heron is about two feet long. It is distinguished by three long, white feathers on the head. This bird, which resembles a small heron, has a hoarse cry and feeds on small aquatic animals. The night heron nests in colonies in trees and returns to the same place each year after migration.

NIGHT′INGALE. A small bird about the size of the American bluebird, but colored a somber brown, the nightingale is world renowned for the haunting beauty of the song of the male. A member of the thrush family and native to Europe, the bird sings principally at night. It is also referred to in poetry by its classical name, *philomel,* and by its Eastern name, *bulbul.* The cardinal in America is sometimes called the *Virginia nightingale.*

NIGHTINGALE, FLORENCE (1820-1910). Founder of the modern code of nursing, Florence Nightingale, affection-

THE LADY WITH THE LAMP
A hospital at Woolwich, England, contains this memorial to Florence Nightingale, a bas-relief showing her comforting wounded soldiers.

ately known as the "Lady with the Lamp," is remembered today as a benefactor of mankind. She became interested in hospital work when she was quite young and studied nursing in Germany and France, where methods were considerably in advance of those used in her own country, England.

The Crimean War gave her an opportunity to show military authorities that nursing could be a humane occupation. After organizing a band of volunteer nurses, she went to the Crimea, where she and her nurses worked in the hospitals. Later she gave valuable advice regarding the care of wounded in the Civil War in the United States, and in the Franco-German War. Some of her writings include: *Notes on Hospitals, Notes on Nursing, Notes on Nursing for the Laboring Classes,* and *Life or Death in India.*

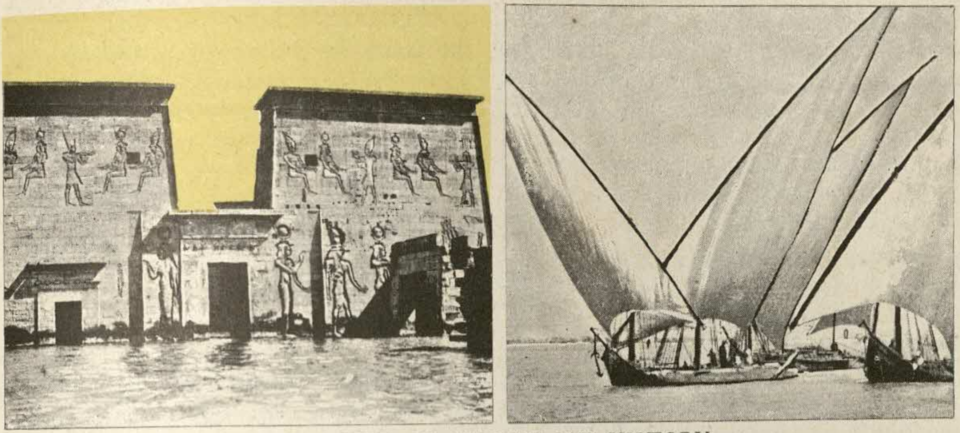
NIGHT'SHADE. The potato, tomato, tobacco, red pepper, eggplant, and other important plants belong to the nightshade family. Representatives are found in nearly every part of the world, and some members of the family are poisonous. The *common* nightshade, which was introduced into America from Europe, is a low-growing annual plant which has white, bell-shaped flowers and black berries. While it is not poisonous in all cases, it does have poisonous properties.

POISONOUS RELATIVE OF TOMATO
Big as cherries, the black berries of the deadly nightshade are dangerously tempting.

Another species is the decorative *bittersweet,* common in North America, especially in the East. This plant has purple or blue flowers and clusters of bright-red berries. The most poisonous species is the *deadly* nightshade, which bears large, black berries the size of cherries. It is widely cultivated in Europe because it is the source of belladonna, which is a valuable drug.

NI'KE AP'TEROS, or ATHE'NA NI'KE, Temple of. Near the entrance to the Acropolis at Athens during the Age of Pericles was built this beautiful temple, dedicated to the goddess Athena. It measured eighteen by twenty-seven feet, and had four Ionic columns at each end and a frieze depicting historical and mythological scenes. The building was destroyed by the Turks, but it was rebuilt in 1835. *Nike Apteros* means *victory without wings.* Nike was the goddess of victory. The name was used because Athena was never represented with wings.

NILE. The life of Egypt depends on the waters of the Nile, a river that has mothered centuries of civilization. Flowing through a country that is mostly desert, it overflows its banks each spring, watering the valley in which most of the people of Egypt live, and depositing rich, fertile silt in which grows the grain that feeds the populace.



THE RIVER OF MARVELOUS HISTORY

Never has a stream influenced a civilization more than the Nile, in Egypt. Left, ruins of Philae on a partly submerged Nile island. Right, Arab trading boats at Luxor.

When the pyramids were young, the Nile was worshiped as a god, for the people of that time thought that the river must have some mysterious power in order to rise in June, July, August, and September and fall during the autumn. They believed that it was a kind god, for they knew that if the river did not rise and overflow its banks, they could not raise crops and live.

The Nile has two sources—Lake Victoria and Lake Tana. The White Nile, which is the main stream, flows out of Lake Victoria and winds generally northward. It forms the Ripon Falls, Falls of Karuma, and Murchison Falls, and thirty miles farther on, enters Lake Albert. For 150 miles north of this lake the river is broad and deep, but it narrows and forms cataracts above Gondokoro. The course is then westward until the river reaches Lake No, where it receives the Bahr-el-Ghazal. Turning eastward, the White Nile then is joined by the Sobat River, whereupon it flows due north to Khartoum. The Blue Nile, flowing from Lake Tana, then joins it; and together the streams form the Nile River.

Altogether the river extends about 4,000 miles, a length exceeded only by the Mississippi-Missouri system. The city of Cairo stands at the head of the Delta, through which the Nile empties into the Mediterranean in numerous branches. Navigation is possible from the Mediterranean to the Assuan (Aswan) High Dam, below the first of six cataracts and about 430 miles above Cairo. Begun in 1960, it is one of the largest irrigation-power projects in the world.

For additional information, consult the following articles:

Assuan
Cape-to-Cairo Railway
Egypt
History
Irrigation

NIN'EVEH. Along the east bank of the Tigris River once stood a splendid, glorious city. This was Nineveh, capital of the ancient kingdom of Assyria, and, next to Babylon, probably the most important of all the cities of the Tigris-Euphrates Valley. It was supreme from 1300 B. C. until about 606 B. C., when the Assyrian rule was overthrown by the Medes, Persians, and Babylonians. Nineveh was destroyed, and it was not until 1842, when a French consul at Mosul dug into the great mounds of silt that covered the site, that the city was discovered.

In this excavation, and others that followed, remains of temples, palaces, a library, works of sculpture, weapons, and ornaments were found. It was learned that the capital was quite large, embracing four suburbs. See ASSYRIA.

NIOBE, *ni'o be.* Because she boasted to Leto that she had twelve children, Niobe, wife of Amphion, king of Thebes, lost all her children and was herself turned to stone, according to Greek mythology. Leto only had two children, Apollo and Artemis, but they were immortal. They killed Niobe's children and turned them to stone after the bodies had lain unburied for nine days. The gods, pitying Niobe, changed her to stone also, but she continued to shed tears.

NIRVANA, *neer vah'nah.* See BUDDHISM.

NITER. See SALTPETER.

NI'TRATE. Compounds containing nitrogen and oxygen, each containing some other element mentioned in the name, are nitrates. The ending—*ate*—means that oxygen is a constituent of the substance. Nitrates are salts of nitric acid (see NITRIC ACID), and are soluble in water. They are used in the manufacture of nitric acid, which is of industrial importance. Most nitrates are colorless in solution, although copper nitrate is blue and nickel nitrate is green. In general, nitrates are good oxidizing agents.

Nitrates are to be distinguished from *nitrites,* which always contain less oxygen than the corresponding nitrates.

NITRIC ACID. Important in the arts and in industry is this compound of hydrogen, nitrogen, and oxygen. Nitric acid is commonly made by treating sodium nitrate with somewhat diluted sulphuric acid in cast-iron stills and then condensing the vapors of nitric acid as they come off. A commercial nitric acid may contain anywhere from fifty to seventy per cent nitric acid mixed with water.

Nitric acid is a powerful oxidizing agent. It dissolves most metals. Platinum and gold are among the exceptions; but a mixture of three parts hydrochloric acid and one part nitric acid is known as *aqua regia* and dissolves platinum and gold. Cotton and wood, which contain cellulose, can be changed to cellulose nitrate, a high explosive. Guncotton, picric acid, dynamite, gunpowder, pyroxylin, celluloid, all contain derivatives of this acid.

NITROGEN, *ni'tro jen.* Four fifths of the atmosphere is nitrogen, the colorless, somewhat inert gaseous element so important to the growth of plants and animals. It is free in the air, yet most living things cannot use it in this form; it must be combined with other elements. An exception is the plant family of legumes, which can use free nitrogen as food. Most plants obtain this element from nitrogenous fertilizers, such as sodium and calcium nitrates, which are soluble and therefore immediately available to plants.

Nitrogen prevents the oxygen in the air from causing too rapid combustion, and is therefore an essential diluent in the air we breathe. See ATMOSPHERE.

Free nitrogen is *fixed* by electrical and chemical processes to make ammonia, ammonium salts, nitric acid, nitrates, and many other valuable commercial products. The symbol of nitrogen is *N.*

NITROGLYCERINE, *ni tro glis'ur in.* So dangerous is nitroglycerine to handle that it might well be called "liquid death." It is one of the most violent explosives known, and produces a volume of gas 10,000 times its liquid volume. Nitroglycerine is so sensitive that a slight jar may set it off; consequently, extreme care must be exercised in using it.

Nitroglycerine is a heavy, yellow, oily liquid, insoluble in water, but soluble in alcohol or ether. It is manufactured by combining glycerine with sulphuric acid and nitric acid. The glycerine is injected in a fine spray. When the mixture is cooled, the nitroglycerine can be drained off. To prevent spontaneous explosion, all traces of acid must be removed from the mixture.

Because of its extreme sensitivity and the dangers of transporting it, nitroglycerine is usually prepared near where it is to be used. It is used in blasting in quarries and in engineering work, and is an important ingredient of dynamite and smokeless powder. Before the days of the automatic electric alarm, it was extensively used by "safe-crackers," who usually referred to it as "soup." It is sometimes employed in treating diseases of the heart. See DYNAMITE; EXPLOSIVES.

NIXON, RICHARD MILHOUS (1913-) thirty-sixth vice-president of the United States. He was graduated from Whittier College and Duke University Law School. From 1937 to 1942 he practiced law in Whittier, Calif. During World War II he served with the United States Navy. Nixon was elected as a Republican to the 80th Congress in 1946 and re-elected in 1948. He was appointed to fill a Senate vacancy in 1950. In 1952 he was elected vice-president to serve with President Dwight Eisenhower, and re-elected in 1956. He became very active in both national and international affairs. In 1960 Nixon won the Republican presidential nomination, but was defeated by Senator John F. Kennedy in the election.

NO'AH. Because of his piety and devotion to God, Noah, son of Lamech and one of the most famous of the Hebrew patriarchs of the Old Testament, was chosen as the father of the new race which was to reinhabit the earth after the deluge. Noah was warned of the flood and instructed in the building of the Ark, which he entered with his family and two of every kind of animal. When the waters subsided, Noah gave thanks and was assured by God that the earth should have no more such floods. See ARARAT, MOUNT.

NOBEL PRIZES. Granted annually from the income of a $9,000,000 fund left by Alfred Bernhard Nobel (1833-1896), the Nobel prizes are bestowed for the most important contributions in the fields of physics, chemistry, literature, medicine, and world peace. The value of the awards varies from year to year and has ranged from $35,000 to $45,000. The prizes are given without regard to nationality.

The awards are made as follows: for physics and chemistry, by the Swedish Academy of Science; for physiology and medicine, by the Caroline Medical Institute in Stockholm; for literature, by the Swedish Academy; for peace, by a committee of five chosen by the Norwegian Storting. Since 1901, when the prizes were first bestowed, Americans have been honored in each of the five fields.

NOBIL'ITY. In many countries certain groups of people are granted high privileges of a social nature and are recognized by a special title such as lord, count, duke, and earl. These titles may be either hereditary or bestowed by the ruler of a country on one of his subjects as a mark of distinction. Usually, certain estates and sometimes political authority accompany a title of nobility, although it is not common today. At one time, most European countries were divided into small sections which were administered by powerful nobles. As governments became more centralized, their powers declined.

In England today, titles carry little more than social prestige, while in France, Germany, Italy, and Russia, there is no government recognition of titles. The Constitution of the United States specifically states: "No title of nobility shall be granted by the United States."

NOCTURNE, *nok'turn.* A musical composition which conveys an impression of the hushed, soft dreaminess of the night is called *nocturne,* a French word meaning *night piece.* Chopin excelled in the composition of nocturnes. Some of the paintings of such artists as Whistler, which express the quiet mystery and beauty of the night, are also known as nocturnes.

NON-COMMISSIONED OFFICER. See RANK.

NORMAL SCHOOLS AND TEACHERS COLLEGES. In America, the normal school specializes in the training of elementary school teachers; the teachers college, in the preparation of both elementary and high-school teachers. In these schools students are given special training in educational psychology, history of education, tests, measurements, statistics, and general methods of teaching. Practice teaching in actual schools forms an important part of the work.

All states maintain at least one normal school or teachers college, and a few of the larger states have several. In some of the larger universities and colleges, teacher training is given in special courses.

The first normal school in the United States was established at Lexington, Mass., in 1839.

NORMAN ARCHITECTURE. When Edward the Confessor ascended the throne of England in 1042, he introduced Norman culture. and Norman architecture to his kingdom. William of Normandy succeeded him on the throne in 1066, and a great period of building followed in the Norman style. It is a massive, Romanesque style with rounded arches, into which the French injected the Gothic influence toward the end of the Norman period by introducing the pointed arch. Up to the twelfth century it was the prevailing fashion in church architecture.

Norman churches were in the form of the Latin cross, with high-vaulted, ceilingless nave and aisles on each side; the short arm of the cross was the transept; at the east end of the nave was the semicircular apse. Heavy pillars or clusters of them supported the three-story nave, and the walls were so thick that doors were usually recessed and windows were narrow. Huge, square towers at the west end of the nave were frequently ornamented, and sculpture decorated the doors. The masonry was left rough, with large joints. Beautiful mosaics, elaborate carved moldings, and sculpture were characteristic of the Norman cathedrals, many fine examples of which remain.

NOR'MANDY. When the great Roman Empire was at its height, one of the most important provinces of Northern France was Normandy. This area is now made up of the departments of Orne, Manche, Eure, Seine-Inférieure, and Calvados, which contain some of the richest and most fertile lands of France.

Held originally by the Romans, the land was seized by the Franks in the fifth century, following the decline of the Roman Empire. In the year 911 came the hordes of conquering Norsemen, or Normans, from whom the land received its name. Their leader, Rollo, was made a Duke of Normandy by sanction of Charles the Simple, king of the Franks. One of the later rulers, Duke William II, became king of England as William I in 1066 by defeating Harold in the Battle of Hastings. As a result, Normandy was annexed to England. After William's death it was separated from England and ruled by his son Robert. It was retaken by England in 1106 and held until the French won it in 1203. It was retaken by the English several times, but finally became permanently French in 1450. The Allies landed on the Normandy coast in their invasion of Europe in World War II. See WILLIAM I.

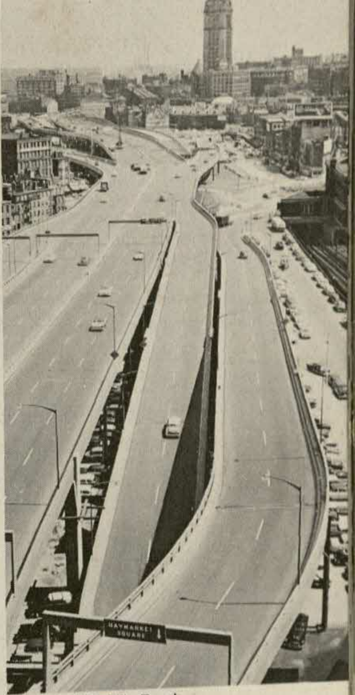
NOR'MANS. In 1066, William of Normandy and his Norman followers invaded England and began the history of the country as a united nation (see WILLIAM I). Unlike the other people of France, these people were neither Franks nor Gauls, but were Northmen, descendants of the vikings who had come from Norway to settle in the land they called Normandy. They developed different laws, language, and customs from those of the viking countries, but they continued their custom of ravaging other lands. In the eleventh century, besides conquering England, they ravaged Italy, Sicily, and other southern countries, and were among the leaders in the Crusades. They settled in most of the countries they invaded.

For additional information, consult the following articles:

England
Normandy
Northmen
Sicily

NORTH, FREDERICK, Lord, Earl of Guilford (1732-1792). During the period of the American Revolution, Lord North was Prime Minister of England. He was dominated by George III and many times was forced to carry out policies of which he did not approve. He supported and enforced the tax on tea in the American colonies, and the Boston Port Bill. During the closing years of his life, North was totally blind. See REVOLUTIONARY WAR.

Oregon State Highway Department



Bureau of Public Roads

LAND OF STARTLING CONTRASTS

Rich growing areas, such as Oregon's Hood River Valley, are found in many areas of the United States and elsewhere in North America. Interstate and local traffic moves swiftly into the cities over wide expressways such as Boston's Central Artery, right.

NORTH AMERICA. The natural wealth of this northern division of the Western Hemisphere has been spread with a lavish hand, giving truth to the statement that the people of North America could live within themselves, independent of the rest of the world. This abundance of wealth has allowed the nations of North America to live in peace, for, unlike the countries of Europe and Asia, they lack neither space nor the essential resources. On this continent are two of the largest English-speaking countries in the world—Canada and the United States. Here, too, there are no monarchies, for North America is a continent of republics.

Less than 500 years ago, the civilization of Europe, which had its roots in antiquity, supplanted that of the North American Indians. Inheriting nearly half the natural wealth of the world, and freed from the shackles of ancient customs, beliefs, and traditions which have hampered the people of older countries, the Europeans who poured into this continent made unprecedented progress in forcing an untamed wilderness to serve their needs.

The continent extends from the North Pole to approximately ten degrees north of the equator, thus experiencing nearly every kind of climate. Its location between the two largest bodies of water in the world has made possible the development of an extensive commerce, with no near-by competitors or enemies, and with many excellent natural harbors. In addition, it possesses a wide variety of fertile soils and untold mineral wealth.

The Land and Its Features. North America extends from north to south for about 4,500 miles, and its maximum width is about 4,000 miles. It is the third largest continent, ranking below Asia and Africa. Its total area is about 8,300,000 square miles.

The geographic features of North America fall into three main divisions: the Rocky Mountain Highland and the coastal ranges of the West, the great central-plains region, and the Appalachian Highland on the east. From the northernmost tip of Alaska to the Isthmus of Panama, the west coast of North America is traversed by a system of mountain ranges, sometimes called the Cordilleras.

In the northwestern part of Canada, these ranges divide into two sections, one turning east and south, forming the Rockies, and the other continuing straight southward to form the coastal ranges. Just to the north of the United States boundary, the western branch splits into two parts. One branch retains the name Coast Range as it continues south through the United States into Lower California; and the other branch, farther to the east, is called the Cascades for part of the distance and the Sierra Nevadas farther south in California. The middle and eastern ranges extend into Mexico as the Sierra Madre Occidental and Sierra Madre Oriental.

Between the Sierra Nevadas and the Rocky Mountains proper lie the Columbia Plateau to the north and the Colorado Plateau farther south. Between these two plateaus is a low-lying area called the Great Basin, formerly the bed of a vast geologic lake, of which Great Salt Lake is but a remnant.

To the east of the mountain system is the great central-plains region, which extends from the Arctic Ocean to the Gulf of Mexico and from the Rockies to the Appalachian Mountains. The Laurentian Plateau extends like a crescent from Labrador around the southern end of Hudson Bay and is sometimes referred to as the Height of Land. From it the land on the inner slope drains to Hudson Bay; that on the outer slope drains to the Arctic Ocean, the Mississippi Basin, and the Saint Lawrence system. Toward the Arctic Ocean and Hudson Bay the land is level and swampy, while to the South is the huge granary of the central plains, where the fertile, glaciated soil produces vast quantities of grain. It includes the prairie states of the Mississippi and Ohio river valleys.

The mountains of the Appalachian range are older than the Rockies and so are lower and more rounded in outline. The system extends from the Gulf of Saint Lawrence almost to the Gulf of Mexico, and its highest point, Mount Mitchell in North Carolina, is only 6,684 feet. On the eastern side, these mountains merge with the Piedmont Plateau, which slopes down to the coastal plain. On the western side the Appalachians slope gently down to the prairie region.

The north-central part of Mexico consists of a high plateau flanked on the west and east by the Sierra Madre ranges. Much of the area about the Gulf of Mexico is a low, tropical coastal plain. As the "cornucopia" of Mexico narrows and swings eastward, it is extremely mountainous throughout its breadth.

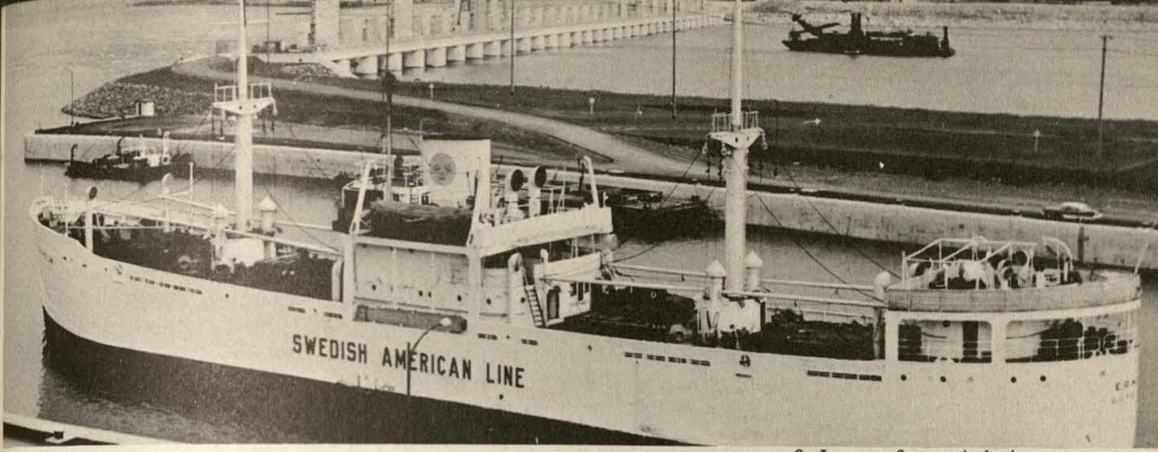
Waterways of the Continent. The Mississippi River and its numerous tributaries drain the greater part of the central-plains region, but to the north are the Mackenzie River, flowing into the Arctic Ocean, and the Saskatchewan, Red, and Nelson rivers, draining into Hudson Bay. The Rio Grande drains a part of the Colorado Plateau, forms part of the boundary line between Mexico and the United States, and flows into the Gulf of Mexico.

The main rivers of the Pacific region are the Columbia, the Frazer, and the Yukon. Much of the basin and plateau region west of the Rockies is drained by the Colorado River, which empties into the Gulf of California. The Atlantic system is composed of a number of rivers, the most important of which are the Saint Lawrence, the Hudson, the Delaware, the Susquehanna, and the Potomac.

There are more lakes in North America than in any other continent in the world. The largest are the Great Lakes, covering an area of more than 90,000 square miles. Other large lakes are Lake of the Woods, Rainy Lake, Lake Winnipeg, Great Bear Lake, Athabasca Lake, and Great Slave Lake.

Including canals, there are navigable waterways from New Orleans up the Mississippi to the Great Lakes, and then to the Atlantic by way of the St. Lawrence Waterway (see SAINT LAWRENCE WATERWAY). These interior waterways have been tremendously important in the economic development of Canada and the United States.

Climate. Although every type of climate can be found in North America, the greater part of the continent has a tem-



St. Lawrence Seaway Authority

THE ST. LAWRENCE SEAWAY, GREAT WATERWAY PROJECT

A Swedish ship leaves Iroquois Lock, most westerly of the Seaway locks. In the background is the Iroquois Control Dam. Seaway gives ocean-going crafts access to ports on Great Lakes.

perate climate. True Arctic conditions are found in the north, where it thaws for only a short time each summer. To the south of this region and extending to the tip of the continent there are great variations of climate from east to west. The regions along the Atlantic coast have greater extremes of temperature than those bordering the Pacific, despite the fact that they are in the same latitude. The Pacific coast has abundant rainfall, because of the moisture-bearing winds from the ocean. These winds, however, lose their moisture before they pass the great mountain ranges, and in the southwestern part of the United States desert conditions prevail.

It is on the central plains and prairies that the greatest extremes of heat and cold are found, because this region is far removed from the modifying influences of the oceans, and because it is open at the north and south to hot and cold winds. The climate of Mexico is sub-tropical, and that of Central America is characteristically tropical.

Natural Resources. Few, if any, parts of the earth's surface are richer than North America, for not only will the soil produce nearly all that is needed or desired by human beings, but the hills and rocks and mountains contain almost inexhaustible supplies of all the important minerals. The forests were the first natural resource to be extensively exploited by man; they are believed originally to have covered the entire eastern half of the United States and Canada. In the eastern part of the continent are pine and hardwood forests which extend from Hudson Bay to the Gulf of Mexico and westward to Texas. The northern part of these forests, which are mainly spruce, hemlock, fir, and pine, extend westward to the Mississippi River. Northwest of Hudson Bay the forests dwindle in size and finally merge with a vast tundra region covered with shrubs and moss, which extends to the snow-covered Arctic.

The plains and prairies have no forests, but in their original state they were covered with heavy grass. This area is now the chief agricultural section of the continent and nearly all of it is cultivated. The vegetation of the southwest is desert growth, such as the cactus and other shrubs. Western United States and Canada even today have heavy forests, composed chiefly of fir and pine. The vegetation of Mexico varies from that of tropical lowlands to that of desert plateau, depending upon the amount of rainfall. Some sections are heavily forested. Central America has a tropical growth, typical of regions lying near the equator.

If a person were to divide the continent into four equal parts, by drawing a line through the middle from north to south and through the middle from east to west,

Kaufman & Fabry Co.

LIKE TREES SEEKING THE LIGHT
The imposing skylines of North America's largest cities stretch upwards for hundreds of feet. Many of the continent's tallest buildings are in New York City.

Standard Oil Co. of New Jersey

A CONTINENT'S STRENGTH
Self-propelled combines harvest and thresh as they move through a vast field of wheat, above. North America produces about one fourth of the world's annual crop. Below, typical of North America's iron and steel industry is this busy blast furnace plant. Canada and the United States account for about one third of the world's steel.

U.S. Steel Corporation

and then throw away all but the northeastern quadrant, he would still have the largest part of North America's mineral wealth. For here in the region of the Laurentian Highlands, the Appalachians, and the Great Lakes are the continent's richest deposits of coal, iron, copper, clay, and building stone.

The coal deposits extend from Nova Scotia southward through the Appalachian System and westward through the prairies and plains. Iron is found in large quantities in the eastern part of the continent, but the most valuable iron mines in the world are located around Lake Superior. Nickel, granite, marble, silver, limestone, and clay are abundant in the plateau and the mountain regions. The Rocky Mountain region contains large deposits of lead, gold, silver, lignite coal, and other minerals. Until the discovery of copper in Africa, this section had the most valuable deposits of copper in the world.

Animals of North America. To the

Fritz Henle

Ewing Galloway

TO EACH HIS OWN
In Mexico's warm climate, fruits and vegetables flourish and are traded in the open market. The Eskimo rarely tastes such foods. In the severe cold of his Arctic home, he hunts polar bear for a hearty meal.

early explorers of North America it was not the dense forests and mineral resources that had the most value in their eyes, but the abundant wild life which, they saw, would supply a large fur industry; and it was primarily the search for fur-bearing animals which led to further discovery and exploration. The highly developed fur trade of the French and the English was based on the beaver, opossum, mink, otter, and black bear that were found in great numbers in Eastern and Central United States and Southern Canada. Although these animals are still found there, their numbers have been so reduced that they are protected by conservation laws. In the northern part of the continent are the walrus, seal, polar bear, fox, otter, marten, and caribou. Canada still has large numbers of reindeer and elk.

At one time the central plains were the home of large herds of bison, but hunters killed them in such numbers that they exist now only in reservations. In the Rocky Mountains are great numbers of sheep, goats, elk, deer, wolves, and bears. The continent has a large number of wild birds, including game fowl such as the duck, goose, and turkey. Among many different reptiles in North America, only the moccasin snake, copperhead, rattlesnake, and coral snake are venomous.

The People of North America. The original inhabitants of North America were an unknown people of Mongolian origin. It is thought that they came to the continent from Asia, crossing on a bridge of land where Bering Strait is located. Most of these people filtered southward to Mexico and Central America, where they built up the oldest civilization known in the Western Hemisphere. Those that remained in the United States and Canada were the ancestors of the American Indians and the present-day Eskimos.

Although the original settlers of the continent were English, French, and Spanish, huge migrations of people from Europe and other places have given North America a representative population from every part of the world. Most of the people of Canada are of English, Scotch, Irish, and French ancestry, while the United States contains elements of every nationality. In Mexico and Central America the Spanish and Indian peoples predominate.

Political Divisions. The nations of North America include Canada, the United States, Mexico, the Central American countries of Guatemala, Honduras, British Honduras, El Salvador, Nicaragua, Costa Rica, and Panama, as well as Cuba, Haiti, the Dominican Republic, Puerto Rico, and the West Indies Federation.

History. North America was first discovered by the Vikings, led by Leif Ericson. But the world knew nothing of its existence until after Columbus' first voyage in 1492. The continent was not called North America until after Americus Vespucius wrote the first description of it. In the sixteenth century, the French, Spanish, English, Dutch, and Portuguese carried on extensive explorations throughout the entire region. The Spanish confined their activities chiefly to Mexico and Southwestern United States, where they searched for gold and silver. The French were mainly interested in the coast of Northeastern United States and the Saint Lawrence River Valley, where they built up a flourishing fur trade. The English and the Dutch explored the Atlantic coast of the United States.

The first permanent English settlement in what is now the United States was made at Jamestown in 1607, and a year later the French established a settlement at Quebec. Plymouth Colony was founded in 1620. The Dutch and the Portuguese lost their colonies, leaving a clear field to England, Spain, and France. These three countries during the next century fought bitterly among themselves for power. Canada was ceded to Great Britain in 1763. After the Revolutionary War, the newly formed United States, either by conquest or purchase, gradually gained possession of the territory once claimed by Spain.

The geography, industries, government, and history of the various political divisions of North America are described in the respective articles on these countries. For more general information, consult the following titles:

Agriculture
Americus Vespucius
Aztec
Coal
Columbus, Christopher
Forests and Forestry
Gold
Indians, American
Iron
Silver

NORTH ATLANTIC TREATY ORGANIZATION. After World War II ended, Soviet Russia was the only powerful nation in Europe. Great Britain and France were greatly weakened by the war, and Germany and Italy were disarmed. The small countries of eastern Europe fell under Russian control, and there was danger that the Communists would seize the whole continent. It soon became apparent that the democratic nations would have to band together to ward off a Russian attack. The United States, the only nation which could match the Soviet Union in strength, had to act as leader of the anti-Communist countries.

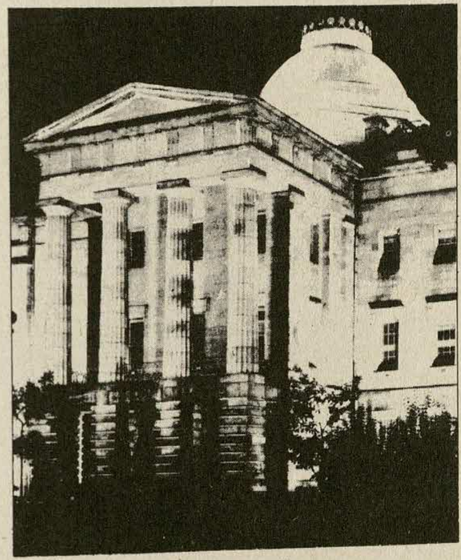
The North Atlantic Pact was signed in Washington, D.C., on April 4, 1949, by the United States, Great Britain, France, Canada, the Netherlands, Belgium, Luxembourg, Italy, Norway, Denmark, Iceland, and Portugal. The treaty set up the North Atlantic Treaty Organization (NATO).

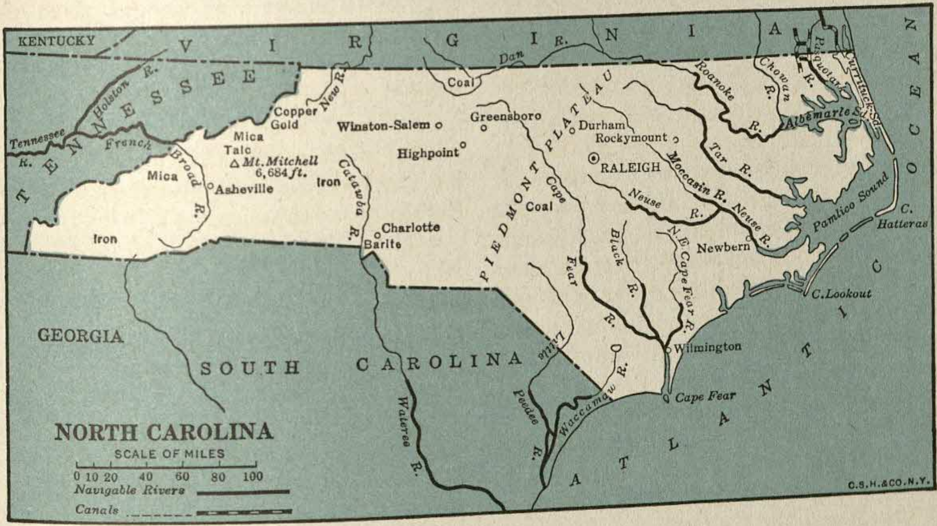
The treaty provided for peacetime economic co-operation and military assistance for its members in case of attack. Every signer agreed to build up its armed forces, with the United States providing billions of dollars for economic and military assistance, as well as about 15 per cent of the military program. NATO was directed by a council representing all members. A North Atlantic army, to which all members contributed, was organized, with General Dwight D. Eisenhower as its first supreme commander. Military headquarters of SHAPE (Supreme Headquarters Allied Powers Europe) were established at Fontainebleau, near Paris, in 1951.

In 1952, Greece and Turkey joined NATO. Eisenhower resigned his post during the same year. The German Federal Republic (West Germany) was admitted in 1955.

NORTH CAROLI'NA. Mystery surrounds the birth of "the Old North State," one of the thirteen original colonies. Sir Walter Raleigh, in 1587, sent a group of colonists to Roanoke, North Carolina, after an earlier group had returned home because of a food shortage. Shortly afterwards the governor went back to England. When he returned to America, the colony had vanished. All he found was the word *Croatoan* carved on a tree. To this day, the settlement is known as "the Lost Colony of Roanoke."

Geographically, North Carolina is one of the South Atlantic states. It is bounded on the north by Virginia, on the east by the Atlantic Ocean, on the south by Georgia and South Carolina, and on the west by Tennessee. With an area of 52,712 square miles, North Carolina ranks twenty-eighth among the states.





"DOWN HOME, THE OLD NORTH STATE"

A leader among Southern states, both in manufactures and agriculture, North Carolina appears to be entering a new period of prosperity. Above, the State Capitol at Raleigh.

Features of the Land. North Carolina is divided into three distinct regions. The first is the coastal plain, a level area which slopes gradually to the swampy lowlands along the sea. For more than 300 miles the coast is separated from the ocean by a sand bar, a chain of barrier beaches. Sand bars surround Albemarle and Pamlico sounds and other indentations. Dividing this region from the higher Piedmont Plateau is the Fall Line. The plateau is rolling in the eastern part but becomes more rugged as

State of North Carolina

IN 18TH CENTURY NORTH CAROLINA

Winston-Salem girls re-enact an early scene near God's Acre in Old Salem, N.C. In the background is the steeple of the Moravian Church, established about 1740.

it extends westward. Farther west lies the highland region, which includes a section of the Blue Ridge, the Great Smoky, and the Black mountains. Here the mountains are heavily forested, and at some points reach altitudes of over 6,000 feet. Mount Mitchell, 6,684 feet, is the highest elevation east of the Mississippi.

The rivers of the highland region flow west or northwest and include the French Broad, the Hiwassee, and the Little Tennessee. East of the highlands, the rivers cut deep valleys through the Piedmont Plateau on their way to the Atlantic. The most important of these rivers are the Cape Fear, the Yadkin, the Catawba, the Roanoke, the Neuse, and the Tar.

Climate. North Carolina has a generally mild climate and abundant rainfall. Both temperature and rainfall are influenced by the Atlantic Ocean and the mountains. The temperatures are not extreme, seldom going below 20°F. in winter or above 90° in summer. The average precipitation is about fifty-two inches a year. Asheville, on a plateau between the Blue Ridge and Great Smoky mountains, is a famous year-around health resort.

Natural Resources. North Carolina has deposits of nearly all the minerals found in the United States, although not all of the deposits are large enough for profitable mining. The most valuable are mica, clay, kaolin, granite, coal, feldspar, limestone, and sandstone. Gold was at one time an important product but its output has greatly declined. Other minerals include copper, lead, quartz, and garnet.

Much of North Carolina is covered with timber, about half of which consists of hardwood trees. At one time the state was a leading producer of tar, pitch, and turpentine, but this production is now negligible. Lumbering, however, is still one of the most important industries.

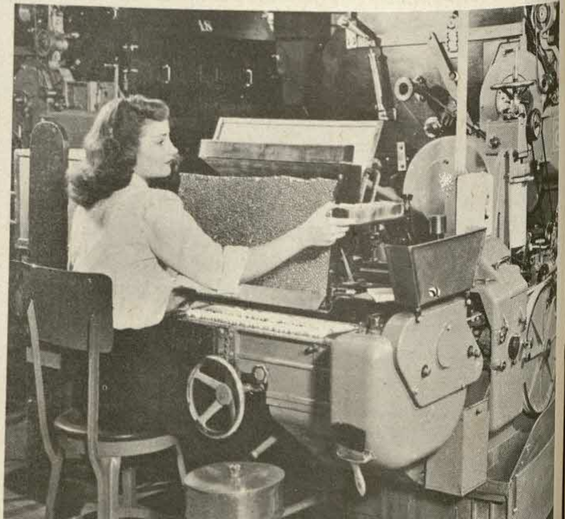
The entire coast of the state is adapted to commercial fishing. With the numerous sounds and other indentations, North Carolina has a long coast line. Here are shallow waters that abound in shad, menhaden, oysters, herring, bass, clams, shrimp, and crabs.

Agriculture in North Carolina. The rich and varied soil of North Carolina and the mild climate make possible a wide

CIGARETTE INSPECTION

Cigarettes from an intricate machine in a large tobacco plant in Winston-Salem are closely watched by an inspector. Every care is taken to keep imperfect cigarettes from reaching the final packing stage.

State of North Carolina



State of North Carolina

SHOWPLACE OF THE NORTH CAROLINA CAPITAL

One of the most impressive new structures in Charlotte, N.C., is the ultramodern Coliseum, featuring one of the largest steel, aluminum, and precast concrete domes in the world. The city is also the site of Queens College for women and the Mint Museum of Art. Charlotte is the largest city in North and South Carolina, and one of the chief distributing points in southeastern United States. Its major industry is textile manufacturing.

variety of crops. A large portion of the land is given over to farming, in which nearly half the people of the state are engaged. Crop production is the most important part of this industry, although livestock raising is becoming increasingly important. The most valuable crop which North Carolina produces and in which it leads the nation is tobacco, the average yield being about 570,000,000 pounds a year. Cotton is also important. More land is devoted to the raising of corn than to any other crop. Other important farm products are wheat, potatoes, peanuts, oats, hay, and fruits.

Manufacturing. North Carolina has made great progress in the development of manufacturing industries. Its abundant water power, plentiful raw materials, and good transportation facilities have greatly aided in this development. The principal manufactures are cotton and tobacco products, in which North Carolina surpasses all other states. There is an increasing and prosperous development of the rayon industry. The lumber industry is also of great importance, and many people are employed in the manufacture of furniture and other timber products. Other important manufactures include leather, fertilizer, and cottonseed oil.

Transportation and Trade. North Carolina is crossed by several trunk lines, which, along with a number of smaller lines, give the state about 5,000 miles of railroads. In addition to thousands of miles of highways, the state is well provided with water transportation in the many rivers and canals. There is also considerable traffic along the coast; Wilmington, with both coastwise and transatlantic traffic, is the leading port of the state.

The People and Their Government. North Carolina was first settled by the English, Scotch, Germans, and Irish, who even today form the basic population. Negroes form twenty-eight per cent of the total population, and there are about 3,500 Indians. The population of the state is more than 4,569,000. The largest city is Char-

INLET AT CAPE HATTERAS

Inlets divide North Carolina's coastal sand bar into long, narrow islands. Cape Hatteras is very dangerous for shipping. It has been marked by famous lighthouses.

lotte, followed by Winston-Salem, Durham, Greensboro, Asheville, and Raleigh, the capital.

The governor and other state officers are elected for terms of four years. There is also a council of state made up of the governmental officials, with the exception of the lieutenant-governor and the attorney-general. The governor is the director of the budget and has the power of appointment but not the veto power. He may not succeed himself. In the general assembly there are fifty senators and 120 representatives, each elected for two years. A supreme court heads the judiciary.

Education. North Carolina is noted for its excellent educational system. The state-wide system is administered by a school commission and a state superintendent. Education is free and compulsory for children between the ages of seven and thirteen. Separate schools are maintained for white and colored children. The public-school system is headed by the state university at Chapel Hill. Other institutions of higher education include the State College of Agriculture and Engineering, Duke University, Davidson College, Wake Forest College, and Salem College. Among the state-supported schools for Negroes are Shaw University and Livingstone College.

History. Had it not been for the failure of the Roanoke Colony, North Carolina would have had the honor of being the first state settled in the New World. As it was, the colony at Jamestown, founded in 1607, gave Virginia the honor. The first permanent colonists in North Carolina were people from Virginia, who arrived about 1630. Other colonists came later, and in time a prosperous trade developed with the New England colonies in tobacco and corn. The colonists suffered under the harsh rule of the Lord Proprietors, to whom the king had granted both North and South Carolina in 1663. The Carolinas were separated in 1728, and thereafter each was a royal province.

North Carolina took an active part in the Revolutionary War, and two important battles were fought on its soil. It was one of the last states to ratify the Federal Constitution.

North Carolina voted to secede from the Union in May, 1861, although it had at first opposed secession. Its part in the Civil War was a tragic one, for it lost more men than did any other state. The reconstruction period in North Carolina brought many injustices to the people of the state, owing to the corrupt carpetbag governments. The state was readmitted to the Union in 1868. In 1875 the constitution was amended; it has been changed somewhat on several occasions since then. See RALEIGH.

Northern Pacific Ry.

NATIVE SONS AND ADOPTED SON

Souix Indian braves admire the statue of Theodore Roosevelt at Mandan, North Dakota, near where the former President had his ranch.

NORTH DAKO'TA. Long before the white man came to the prairie regions of the United States, North Dakota was a happy hunting ground for the Sioux, or Dakota, Indians, who gave the state its name, which means *allied*. When it was first explored, huge herds of buffalo, antelope, and deer grazed on its rich prairie pastures. Here meat and valuable furs were easily obtained. It was truly a paradise for the pioneer hunter and trapper. When the region was opened for white settlement by the Federal government, in 1851, thousands of farmers swarmed into the territory. With the coming of the railroads, North Dakota soon became one of the leading agricultural states in the Union, with wheat its chief product.

The state is a part of the central-plains region that stretches through the United States and into Canada. On the east is the Red River of the North, beyond which lies Minnesota; on the south is South Dakota; Montana lies to the west; and the northern limit is the international boundary line, which separates the state from Canada. The area of North Dakota is 70,665 square miles.

Features of the land. North Dakota is a vast prairie which can be divided into three distinct sections. In the east is the level valley of the Red River, about forty miles wide. To the west of the valley is a rolling plain which rises gradually to a high escarpment in the middle of the state, known as the Plateau du Coteau du Missouri. This escarpment crosses the state from northwest to southeast. West of the escarpment is a higher plain which slopes westward until it reaches a height of more than 3,000 feet. This part has a rolling and broken surface, and in the southwestern part are buttes like those of the Bad Lands.

The rivers of North Dakota are of little commercial importance. The Missouri is the largest and, with its tributaries, drains the greater part of the state. In the east are the tributaries of the Red River, such as the Sheyenne, Goose, Maple, and Pembina, which are important for drainage.

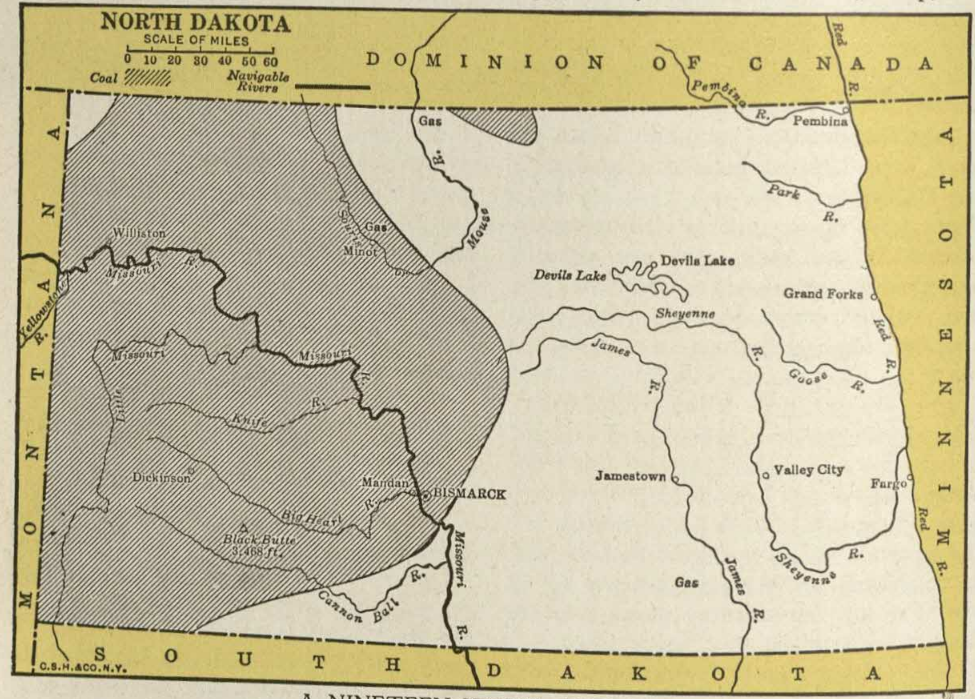
Climate. The average temperature of North Dakota is about 40° F.; but there are great extremes of heat and cold. The dry atmosphere, however, makes these extreme temperatures tolerable. The average rainfall for the state is only eighteen inches, although it is somewhat heavier in the eastern sections. In the western part of the state there is scarcely enough rain for farming.

A NINETEEN-STORY CAPITOL

The low portion of this striking building in Bismarck houses the two chambers of the legislature; the tower contains state offices. It is built of Indiana limestone.

Natural Resources. Lignite coal is abundant in the western half of North Dakota, and more than a million tons are produced each year. It is the chief fuel of the state. Pottery clay and brick clay are also found in large quantities. With the exception of the coal and clay deposits, there are few mineral resources.

Farming in North Dakota. Agriculture is the most important industry in North Dakota. For the most part, the state has rich, glaciated soil that produces large crops. The most productive region is the valley of the Red River. The state is first in the Union in the production of spring wheat, which is the chief crop. Other grains include rye, flax for seed, oats, barley, and corn. Potatoes are raised in large quantities throughout the state. Agriculture in the central part is of a general nature, the farmers not specializing in any one crop. In the western parts, where rainfall is scanty, livestock raising is the leading industry. Here beef cattle, sheep, and horses are raised in large numbers. About ninety per cent of the land area of North Dakota is devoted to farming.



Manufacturing and Transportation. Manufacturing in North Dakota is based chiefly on agriculture. The leading product is flour. The manufacture of dairy products is also a leading industry. Meat

Int. Harvester, Greater No. Dakota Assoc.

BREADBASKET OF THE NATION

North Dakota grows much wheat and her flour mills (like the one above) process more flour than does any other state. Flax (right) is grown in the north.

packing is becoming increasingly important. Brick, tile, and pottery are manufactured in many places.

Several transcontinental railroads cross North Dakota, with numerous branch lines that run north and south, giving the state excellent transportation facilities. In addition, freight is shipped on the Missouri River.

The People and Their Institutions. Native-born whites comprise about eighty-five per cent of the population, which is about 633,000. As in typical agricultural states, there are few large cities. The leading cities are Bismarck (the capital), Fargo, Minot, and Grand Forks.

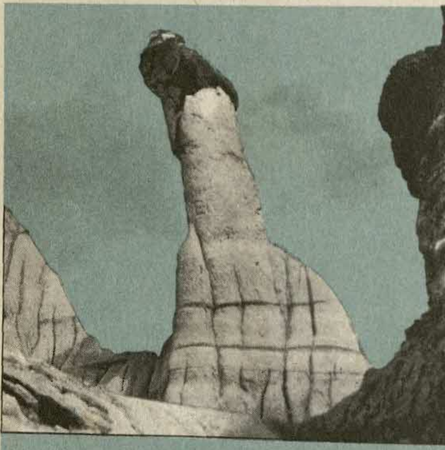
The executive branch of the government consists of a governor and other state officers who are elected for two years. There is a two-house legislature composed of a senate of forty-nine members elected for four years and a house of representatives of 113 members elected for two years. The judicial department consists of a supreme court of five judges and a number of district and local courts.

The school system is directed by a state superintendent and a board of education. Children between the ages of seven and seventeen are required to attend school, and free education is provided from the elementary grades through the University of North Dakota at Grand Forks. Other institutions of higher learning are Wesley College, Jamestown College, the North Dakota Agricultural College, at Fargo, and several teachers' colleges.

CATTLE ENJOY POTATOES

Livestock helps eat big potato crop.

History. A trading post was established in North Dakota as early as 1797. It was, however, only temporary, the first perma-



South Dakota State Highway Commission

BEAUTIFUL BUT BAD

The Bad Lands of the Dakotas were shaped by wind into weird formations.

nent settlement being established in 1819. North Dakota was part of the Louisiana Purchase in 1803. Until the coming of the railroad and the invention of farm machinery, the territory developed very slowly. For a time, part of the region belonged to Minnesota Territory and part to Nebraska Territory. It became known as Dakota Territory in 1861. In 1889 two states, North and South Dakota, were carved out of the territory and admitted to the Union. North Dakota is noted for its liberal policies, having been dominated for a number of years by the progressive Non-Partisan League. See BISMARCK.

NORTHERN IRELAND. See IRELAND.

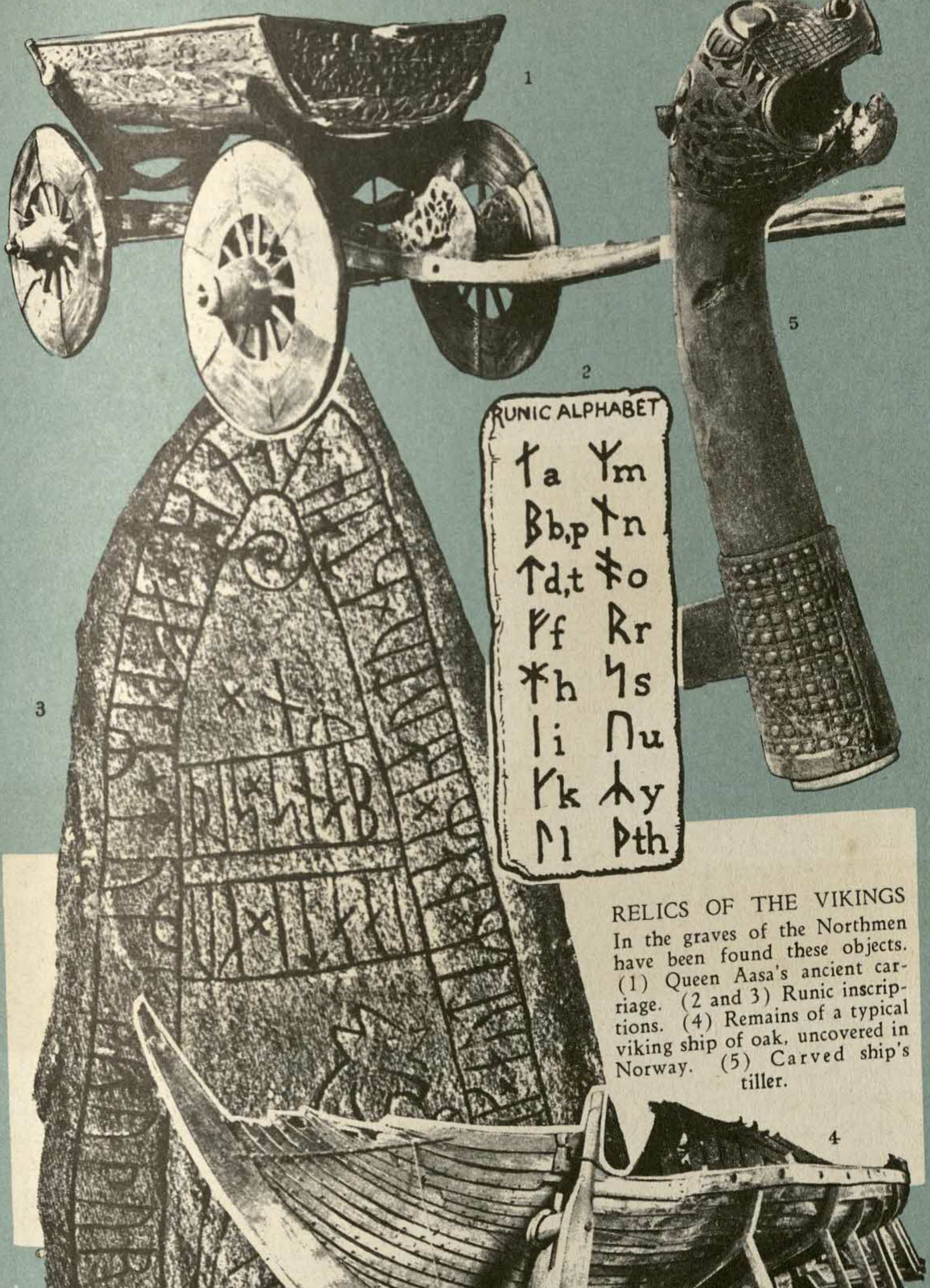
NORTHERN LIGHTS. See AURORA BOREALIS.

NORTH GERMAN CONFEDERA'TION. Prior to the formation of the German Empire, eighteen states under the leadership of Prussia formed this union in August, 1866. Two months later it was increased to twenty-two states. The constitution of the confederation formed the basis of the one adopted for the new empire after the Franco-German War. King William I of Prussia became Emperor William I after the unification of the German Empire in 1871. See GERMANY.

NORTH'MEN, or NORSE'MEN. Hardy and bold, the men of the north roamed the seas a thousand years ago, plundering other lands, pushing their little open boats ever westward to Iceland and Greenland, and even reaching the coast of New England, according to legend. These were Northmen, the vikings of song and story, daring sea rovers who knew no fear and apparently dedicated themselves to war and danger.

Bold Raiders *of the* Deep

The Northmen were originally from Scandinavia. About the eighth century, because their territory was overcrowded and food was scarce, they set sail in search of new lands. Territory in Northern France which they seized they called Normandy. In that land they were called Normans. Northmen from Denmark invaded England, and were a source of trouble until William of Normandy conquered the country, in 1066. Other Northmen settled along the Baltic coast and in Italy, Sicily, and other countries, and remained there, adopting the customs of the country they made their own.



RELICS OF THE VIKINGS
In the graves of the Northmen have been found these objects. (1) Queen Aasa's ancient carriage. (2 and 3) Runic inscriptions. (4) Remains of a typical viking ship of oak, uncovered in Norway. (5) Carved ship's tiller.

Official U. S. Navy Photo

UNDER AND OVER THE POLAR ICE PACK

It was a rare sight when the U.S. Navy submarine U.S.S. "Skate" surfaced several times amidst Arctic ice during its 1959 polar voyage. Survey parties from the submarine were careful to take along rubber life rafts when making their explorations of the ice pack. One of the surfacings was made at the geographic North Pole. The voyage proved the practicality of year-round submarine operation in the polar regions.

These people lived in houses built of firwood, the cracks of which were filled with pitch. The ends of logs, the door posts, and the peaks of the gables were carved into shapes of men and animals and were painted in gay colors. The main building was a feast hall, where the chief and his men would gather nightly to eat and to drink from the beautifully ornamented horns of cattle which they used for goblets.

The ships of the Northmen were open and had sharp prows decorated with the head of a horse or serpent. The viking ship had a mast equipped with a sail, but the men also propelled the boat with long oars. Their round shields would be lined along the side of the boat for protection. The Northmen fought with axes, spears, and swords. They wore helmets, but usually were attired in little else than a tunic and sandals bound around the legs with thongs.

Leif Ericson is supposed to have landed on the shores of New England in the year 1000 and named the land Vinland. If this story is true, he was the first European to discover America. See ERICSON, LEIF; NORMANS.

NORTH PO'LAR EXPLORA'TION.

Over its North Pole the earth wears a cap of ice, thick ice that hides an ocean two miles deep. A forbidding region of perpetual cold, of treacherous ocean currents, of winter-long night, the Pole challenged and defied the bravest explorers and thwarted them all until the twentieth century. Then came Peary; and after him, a long procession of aviators.

That same urge that led Columbus to discover America—the quest for a shorter route by water to the Orient—first sent explorers into the Arctic. Eventually they found the perilous Northwest Passage, through Baffin Bay and the Arctic shores of Canada and Alaska to the Bering Strait. But seal and whale hunting kept the explorers pushing north, and in the nineteenth century scientific investigation of the Polar areas began.

At last Commander Robert E. Peary, an American, found the Pole on April 6, 1909. In July, 1908, he had left New York on the steamer *Roosevelt*. He touched at Etah, northernmost settlement in Greenland, and went into winter camp at Cape Sheridan on September 5. Peary made ready for the dash to the Pole with knowledge gained in twenty-five years of exploration. He spent the winter hauling supplies to Cape Columbia, base of the final march north. Then, on February 28, the first party of the expedition set forth.

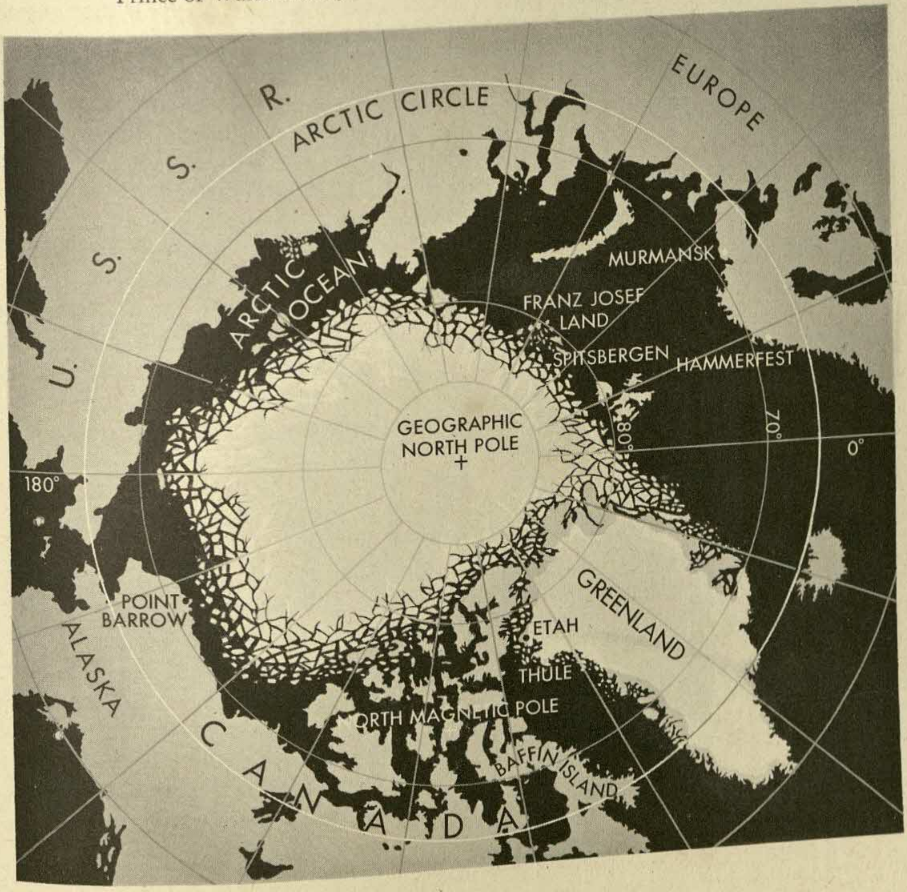
The whole expedition comprised six white men and a Negro, Matt Henson, Eskimos, dogs, and sledges; it was organized in six sections, the first breaking the trail and building igloos (Eskimo houses) as they progressed, to serve as shelters both on the Polar and return trips. At intervals of about five days, a section would start back to the base, as supplies had been used and loads lightened. Professor Marvin of Cornell, leader of one section, lost his life on the return trip.

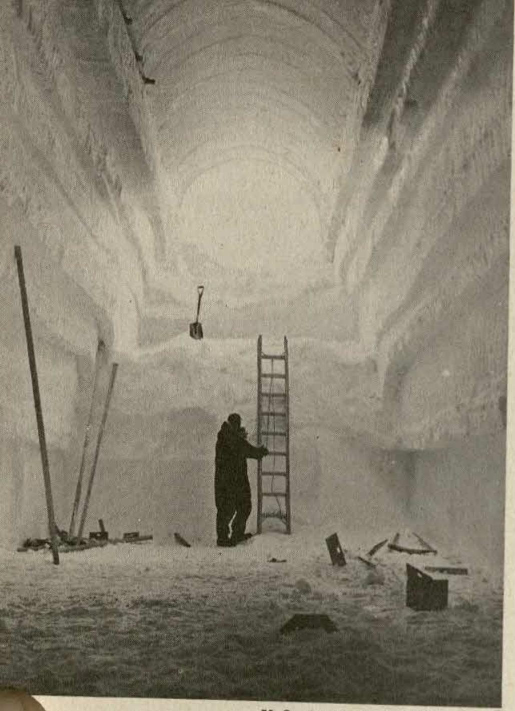
Peary made frequent soundings of the Arctic Ocean, and at the Pole reached a depth of 6,500 feet without bottom. His data indicated that there was no large land area near the Pole, and this is the accepted theory today. Peary, Henson, and four Eskimos finally reached the Pole on April 6, 1909, planted the Stars and Stripes there, and returned to Cape Sheridan.

On previous journeys in the Arctic, Peary mapped Northern Greenland and the Arctic Archipelago, and in 1895 and 1897 brought home from the region of

ICE-LOCKED TOP OF THE WORLD

The Arctic Ocean, frozen to a depth of many feet during the winter, covers most of the North Polar Zone. Much of Greenland, too, is heavily ice-coated. During the summer, when temperatures sometimes rise to 70° F., much of the ice breaks up. Note that the North Magnetic Pole, on Prince of Wales Island, lies well south of the geographic North Pole.





U.S. Army, Corps of Engineers

U.S. Army Photograph

SCIENCE AIDS SURVIVAL IN POLAR REGIONS

The United States Army Corps of Engineers has developed methods for cutting deep, covered trenches, left, in the Arctic ice cap. The trench is covered with an arched snow roof erected by blowing processed snow over a temporary frame. After a day or so, the snow roof hardens and the frame is removed. Above, six-sided "Hextent" keeps troops warm in temperatures as low as —58°F. The tent has a white lining which provides insulation and reflects light. Ground cloth around the bottom seals out cold air. Tent weighs 56½ pounds.

Cape York three large meteors; one of them, weighing nearly 100 tons, is the largest of its kind ever discovered. These meteors are now at the Hayden Planetarium in New York City.

Cook's Expedition. Just one year before Peary's successful expedition, Dr. Frederick A. Cook, who had been the surgeon on Peary's first expedition to Greenland in 1891, sailed to Greenland presumably on a hunting trip. When Peary reached Etah, he learned that Cook had left there some time before to start for the Pole from Ellesmere Land. On the return trip, Cook ran into dangerous ice and open water, spent a second winter in the Arctic, and finally reached Copenhagen September 2, 1909, claiming to have reached the Pole on April 21, 1908, and to have been first to discover it.

The Danish government and learned societies greeted him with great honors; but the scientific world was surprised and skeptical, for Doctor Cook had not announced any intention of attempting a Polar dash. Doctor Cook never presented records which substantiated his claims to the satisfaction of scientists, and eventually Peary was proclaimed by the National Geographic Society, the Royal Geographical Society of London, and by Congress the true discoverer of the Pole.

Arctic Exploration by Air. In 1926 man conquered the Pole by air, and in the years since, the Polar skies have hummed with aircraft. On May 9, 1926, Lieutenant Richard E. Byrd of the United States Navy was piloted to the top of the world from Spitsbergen, and back, by Floyd Bennett: 1,360 miles in less than sixteen hours. On May 12 the dirigible *Norge* sailed over the Pole with the Amundsen-Nobile-Ellsworth expedition, which flew on to Teller, Alaska. On April 15, 1928, Captain George H. Wilkins and Lieutenant Carl B. Eielson flew from Point Barrow, Alaska, to Spitsbergen. 2,200 miles.

On May 23rd of that year, General Umberto Nobile, with a party of sixteen aboard the dirigible *Italia,* radioed that he had crossed the Pole and was turning back to his base at Kings Bay; but on May 25 the *Italia* was wrecked on ice floes. Six of the crew were swept away with the runaway balloon; Nobile and seven survivors were left on the ice, eventually to be rescued. But the famous Roald Amundsen, flying north with five men to rescue the Nobile party, vanished in the Arctic wilderness and never was found.

In 1937, two Russian airplanes flew across the Pole to the western coast of North America. During World War II and afterwards, military flights over the Pole were frequent. Since 1954, commercial airlines have conducted regular transpolar flights.

Submarine Journeys. The first voyage under the North Pole was made by the atomic powered submarine, *U.S.S. Nautilus,* on August 3, 1958. The *U.S.S. Skate* went under the Pole a few days later.

During the International Geophysical Year (1957-1958) scientists set up stations on drifting ice islands near the Pole.

For additional information, consult the following articles:

Amundsen, Roald
Arctic Ocean and Lands
Byrd, Richard E.
Nansen, Fridtjof
Peary, Robert E.

NORTH SEA. Lying between Great Britain and the continent of Europe is a great arm of the Atlantic Ocean called the North Sea, which for its size is probably the leading commercial body of water in the world. It lies in the heart of the world's trading area, and along its shores are the ports of the greatest maritime nations. The commercial ships of Great Britain, Norway, Sweden, Germany, and the Netherlands constantly ply these waters, carrying the goods of all countries. It can truly be said that were it not for the North Sea, the countries of Northern Europe would have little influence in world affairs.

The North Sea is also important for its valuable fisheries. Many nations, in addition to those on its shores, have large fishing industries based on the plentiful herring, cod, and haddock of the North Sea.

With a length of about 680 miles and a maximum width of 412 miles, the sea has an area of about 200,000 square miles. Its deepest point lies near Norway, where the greatest depth is 2,400 feet. The main body of water varies in depth from 100 feet in the south to 400 feet farther north. The bed of the sea is crossed by several heights of land, the largest of which is called the Dogger Bank. Because of the two openings, one at the north between the Shetland and Orkney islands, and the other at the south through the Strait of Dover, the tides, moving in from both entrances, are very irregular. At the point where the two meet there is a tidal range of more than twenty feet.

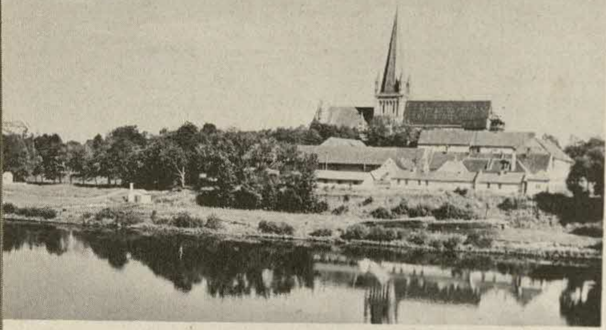
The North Sea is connected with the Baltic Sea by the Skagerrak and Kattegat and also by the Kiel Canal. It is frequently visited by heavy storms and blanketed by dense fogs, which impede navigation. The water of the sea is less salty than that of the Atlantic because of the fresh water emptied into it by the Thames, Humber, Meuse, Rhine, Ems, Elbe, and Weser rivers.

NORTH STAR. See Pole Star.

NORTH'WEST BOUND'ARY. The famous slogan "Fifty-four-forty or fight" was popular during the Polk campaign for the Presidency. It referred to the desire of the people of the United States at that time to establish the boundary line between the United States and Canada, west of the Rocky Mountains, at 54°40′ north latitude. The British government wished to make the Columbia River the boundary line, but in the treaty of 1846 a compromise was reached. The line was permanently set along the forty-ninth parallel to the middle of the channel separating Vancouver Island from the continent. From there it ran through the channel and through the center of the Strait of Juan de Fuca to the ocean.

Prior to this agreement, numerous diplomatic negotiations had taken place. In 1818 the line from the Rocky Mountains eastward to the Lake of the Woods was set at the forty-ninth parallel by a commission, and it provided for joint control over the Oregon territory west of the Rockies. In 1827 this arrangement had been extended. See Oregon.

NORTHWEST PAS'SAGE. For centuries navigators searched for a passage from the Atlantic Ocean to the Pacific by way of the Arctic Ocean along the north coast of North America. The first ship to pass from the one ocean to the other made



IN PICTURESQUE NORWAY

Top, beautiful Nidaros cathedral in Trondheim, built in the eleventh century, has been the coronation place for Norwegian kings for hundreds of years. The town was briefly occupied by the Germans during World War II. Above, a large nitrate fertilizer plant sprawls at the foot of the mountains surrounding Glomfjord in northern Norway. The town is also an important aluminum producing center. Below, fishermen pull up a heavily loaded seine off the coast of Norway.

Mittet Photos

the trip from 1903 to 1906, under command of Roald Amundsen, a noted Scandinavian explorer, but it has never been developed as a trade route because of its climatic and sailing hazards.

Amundsen sailed in his ship, the *Gjoa,* by way of Davis Strait, Lancaster Sound, Peel Sound, and Franklin Strait, to King William Island, and then west to Bering Strait. In 1960 the U.S.S. "Seadragon," an atomic submarine, forged a new Northwest Passage. It cruised from Baffin Bay into Lancaster Sound, then across Melville Sound where it submerged to cross McClure Strait. It emerged in the Beaufort Sea. See NORTH POLAR EXPLORATION.

NORTHWEST TER'RITORY. Before the creation of the states of Ohio, Indiana, Illinois, Michigan, Wisconsin, and Minnesota, that section of the United States was known as the Northwest Territory. Claims to the territory were originally held by Virginia, New York, Massachusetts, and Connecticut by virtue of their charters and grants from the king of England. When Maryland insisted that the territory should be ceded to the United States before a Federal government was organized, the adoption of the Articles of Confederation was delayed.

Finally, Congress in 1780 promised that, if the land should become a part of the national government, it would be divided into states with rights equal to the others, and one by one the states relinquished their claims to the Federal government. The Ordinance of 1787 established a form of government for the new Northwest Territory. See ORDINANCE OF 1787.

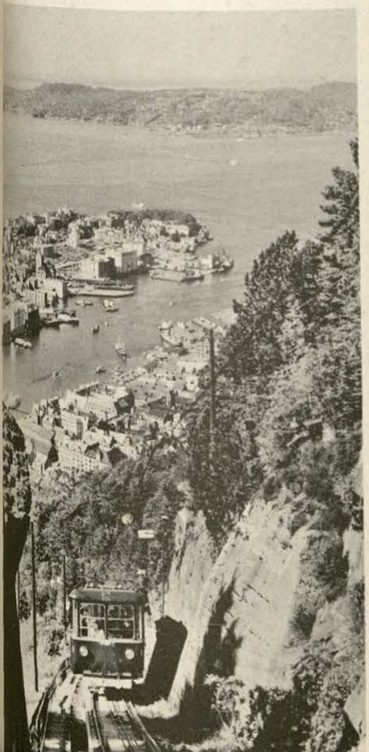
NOR'WAY. Extending along the western part of the Scandinavian Peninsula is Norway, once the barren and mountainous homeland of the sturdy vikings. In modern times, Norway became one of the world's most progressive democracies, whose thrifty and hard-working people made a prosperous nation out of a rugged land. Norway also produced great writers, including Henrik Ibsen, Knut Hamsun, and Sigrid Undset.

Geography. To the east of Norway, also in the Scandinavian Peninsula, are Sweden and Finland. On the north are the frigid waters of the Arctic Ocean, on the west are the North Sea and the Atlantic, and on the south is the Skagerrak, an arm of the North Sea. While Norway is extremely rugged, it consists chiefly of deeply cut plateaus, with mountain peaks rising from these tablelands. The highest mountains are found in the southwestern part of the country. Mount Galdhöpiggen, the highest peak in the Jötunheim Mountains, is 8,400 feet in altitude. The Jostedalsbrae, the most extensive glacier region in Europe, lies just west. Thousands of visitors are attracted to the country each summer by the magnificent scenery of this region, which is enhanced by the cliff-bordered fiords and bays of Norway's far-famed coast line. These countless indentations, which were formed ages ago by the glaciers, give the country a shore line of about 12,000 miles, although the general outline of the coast is only about 1,700 miles in extent.

Norway has many lakes and short, swift-flowing rivers. The principal river is the Glommen, which flows into the Skagerrak. The chief northern river is the Tana.

Climate. Although the climate of Norway is severe, it is moderated to some extent by the currents of the Atlantic Ocean, particularly on the western coast, where winters are mild and summers are cool. This type of climate also prevails on the southern coast. In the interior regions the winters are extremely cold, while the northern portion has an Arctic climate, with two months of complete darkness in the winter and a summer midnight sun. The western and southern coasts have the heaviest rainfall, ranging from fifty to eighty inches.

Natural Resources. Norway is not rich in minerals, but some mining is carried on in the rather meager deposits of silver, iron, copper, and pyrites. Marble, granite, slate, and soapstone deposits yield stone for export. The coal mines of the island of Andö are isolated and of little value. The forests of Norway are very extensive, covering about one fourth of the country, and lumbering is an important industry. The fisheries normally employ about seven per cent of the people. In proportion to the population, Norwegians are the leading fishermen of the world. The cod fisheries are the most important, followed by herring, mackerel, and salmon.

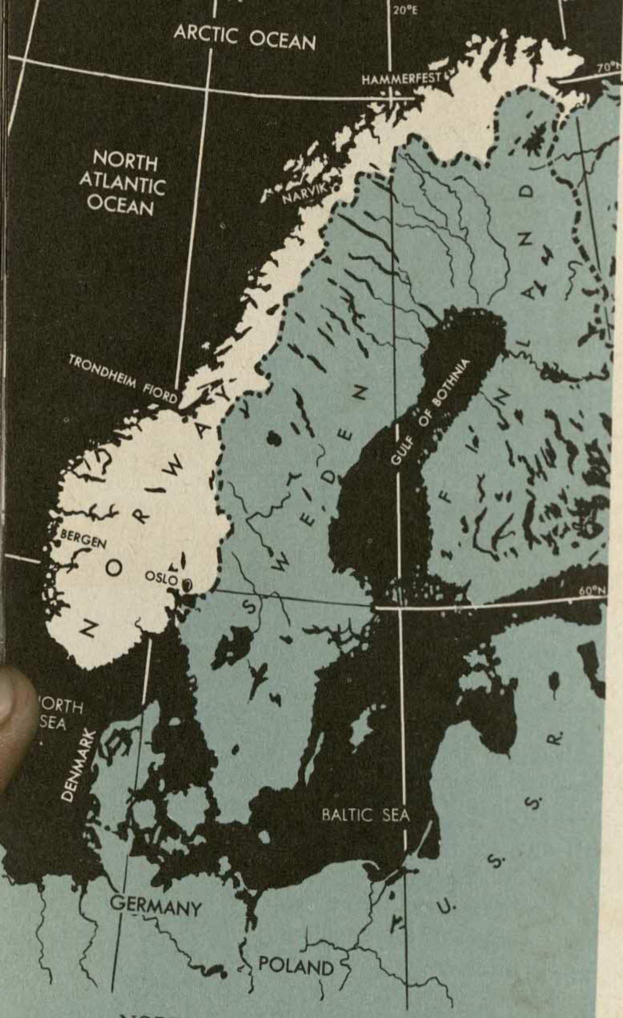


Norwegian Information Bureau

BERGEN FROM THE AIR
Left, a cablecar climbs to a mountaintop overlooking Bergen, Norway's chief port and second largest city. Bergen was the birthplace of Edvard Grieg, famous Norwegian composer.

OSLO ARCHITECTURE
Right, government building in Oslo bears markings resembling early Egyptian art. A cultural center of Norway, Oslo was held by the Germans from 1940 until the end of World War II.

Norwegian Information Bureau



NORWAY'S LAND AND PEOPLE

Above, Norway occupies the western part of the Scandinavian Peninsula, from the Arctic Ocean to the North Sea. Right, Norwegian girl in traditional costume, with cow-calling trumpet.

Farming in Norway. Since only about four per cent of the land of Norway is cultivated, it is necessary for the Norwegians to farm their land very intensively in order to gain a living from the soil. Large quantities of foodstuffs have to be imported. The most productive farm lands are found in the south, where the climate is mild. The leading grain crops are oats, barley, wheat, rye, and corn. Potatoes are raised in large quantities. Livestock raising is an important branch of agriculture, as there are extensive grazing lands which are not tillable. Dairying is a leading industry, and Norwegian dairy products, often manufactured in co-operative dairies, are shipped to markets all over the world.

Manufacturing and Trade. The leading manufactures of Norway largely depend upon agriculture and lumbering, although the development of water power in the country's fast-flowing streams has aided in the growth of the heavy industries. The forests of hardwood, spruce and pine furnish timber for sawmills, paper plants, and other woodworking factories. Forest products constitute about one fourth of the country's exports. Other leading articles of manufacture are food products, clothing, chemicals, textiles, and machinery.

Because of the extensive seacoast and lack of natural wealth, Norway has always been essentially a maritime country. For this reason the country has developed a large merchant marine. This fleet of ships, while it carries the exports and imports of Norway, is, in normal times, chiefly engaged in carrying goods for other nations. The imports, which greatly exceed the exports, usually consist of foodstuffs, coal, iron and steel, hides, and manufactured goods. The chief exports are lumber, paper and pulp, fish, and dairy products. Norway also has an excellently developed transportation system within the country.

The People and Their Institutions. The Norwegians are of the Teutonic race which inhabits the northern parts of Europe. As a rule they are tall and strong with light com-

Norwegian America Line

UPI

YOUNG PEOPLE PLAY IMPORTANT ROLES IN THE LIFE OF NORWAY

Left, Norway's seasoned winter sportsmen are among the best in the world. The nation's athletes have dominated the Olympic ski jumps and placed high in skating since 1924. Right, students of the University of Oslo carry torches during an anti-Communist demonstration.

plexions, although many are of a shorter, darker type. Norway has a population of about 3,530,000. In the northern parts there are small groups of Finns and Lapps, who are of Mongolian origin. By far the majority of the people live in rural areas, with the result that there are only a few large cities. The largest are Oslo, the capital, and Bergen.

Despite the fact that Norway has a monarchical form of government, it is noted for its democratic and progressive legislative system. There is a liberal Constitution and a hereditary throne. The king is at the head of the government, but part of the executive work is carried on by a Council of State, composed of the various department heads. The national legislature, called the Storting, is composed of two houses—the Lagting and Odelsting. All legislation originates in the Odelsting, which has three fourths of the members of the Storting. Both men and women are allowed to vote in Norway.

Although Norway has a national Church, the Evangelical Lutheran Church, complete freedom of worship prevails. Other leading denominations are the Methodists and the Baptists.

Norway has one of the most advanced educational systems in the world. Children between the ages of seven and fourteen are required to attend school. In addition to the regular primary and secondary schools, there are several normal schools and two universities, one at Oslo and one at Bergen.

History. The history of Norway as a united kingdom begins about the year 872, when several small kingdoms were united under Harold I (or Harold Fairhair). During his reign the country rose to prosperity and power. The expulsion of the defeated nobles resulted in the famous viking expeditions. After Harold's death, Norway declined in power, but again became strong under the rule of Haakon IV, or Haakon the Old, in the thirteenth century. During the next hundred years trade increased and colonies were established in Greenland and Iceland.

With the death of Haakon's grandson in 1319, Norway lost some of her independence, for the new king, Magnus Smek, was also ruler of Sweden. Under Haakon

Mittet Photo

HEAVY INDUSTRY IN THE LAND OF THE MIDNIGHT SUN

One of Norway's most important steel centers is Mo. noted also for mining and lumbering.

VI, son of Smek, who came to the throne in 1355, nominal independence was gained. Upon Haakon's death, in 1380, his wife Margaret, a Danish princess, became regent. When her son died, in 1387, she was crowned queen of Denmark and Norway. In 1397, Denmark, Sweden, and Norway were united under one sovereign.

Sweden broke away in the sixteenth century, but Norway and Denmark were ruled jointly until 1814. In this year, as a reward for Sweden's loyalty to the Allies in the war against Napoleon, Sweden acquired Norway. The people of Norway at first rebelled against Swedish rule, but were forced by the nations of Europe to abide by the Treaty of Kiel. Although she was allowed to keep her own Constitution, Norway made constant attempts during the nineteenth century to regain her independence. In 1905 the conflict reached a crisis when Sweden refused the demands of the Norwegian Storting for a separate consulate. Norway then declared her independence, which Sweden acknowledged in the Treaty of Karlstad.

Prince Charles, brother of the Danish sovereign Christian X, ascended the throne as Haakon VII. The country prospered and remained at peace until 1940, when she was invaded and occupied by the Germans. King Haakon directed a Government-in-exile in England throughout World War II. From 1942 until the liberation of Norway in May, 1945, the Norwegian traitor, Vidkun Quisling, headed a puppet government; he was executed as a traitor by the restored regime. Norway is a charter member of the United Nations.

See also the following articles:

Amundsen, Roald
Fiord
Harold I
Ibsen, Henrik
Northmen
North Polar Exploration
Oslo
Sweden
World War II

NOSE. A prominent feature of the face in man and most animals, the nose serves man in three ways—in breathing and smelling and as a part of the vocal apparatus. In some animals, such as the dog, it is combined with the mouth to form the muzzle; in others, such as the elephant and tapir, it is an elongated proboscis.

Man's nose is a triangular pyramid constructed on a framework of bone and cartilage. The bony portion consists of the turbinate bones, the vomer, and the nasal bones. The cartilage passes through the center of the nose and attaches itself to the nasal bones and vomer, dividing the nose into two parts, or nostrils. In the nose there are also blood vessels which warm the air before it reaches the lungs. The nasal passages are lined with mucous membrane in which grow tiny hairs to filter out the dust breathed in with the air.

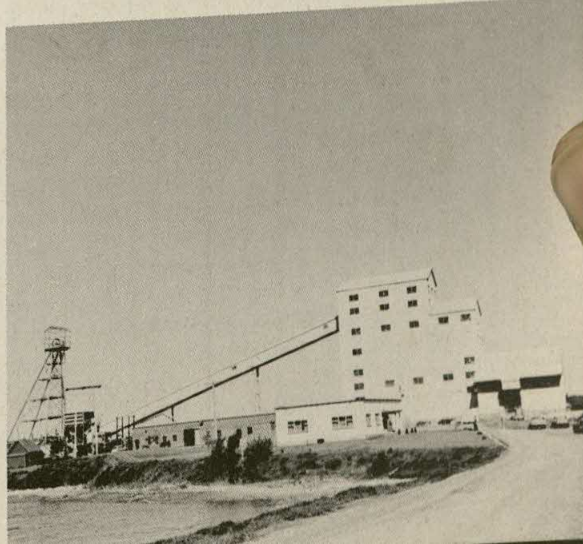
In the upper part of the nose is the "olfactory patch," the center of the sense of smell. This area is connected with the brain by the olfactory nerve, the nerve of smell. Often, when colds block the passages in the upper nose, the sense of smell is deadened temporarily. See BREATHING; SKELETON; SMELL.

NO'TARY PUB'LIC. In almost every community in the United States, Great Britain, and some other countries, there is at least one person who is authorized to make legal, or *notarize,* certain documents such as deeds, mortgages, bills of sale, depositions, and affidavits. In the United States such a person receives his authority from the governor of his state and is called a notary public. Usually the jurisdiction of a notary public does not extend beyond the county for which he is appointed. As a rule, a notary takes an oath of office, gives a bond as a guarantee that he will perform his duty in accordance with the law, and receives a special seal which he attaches to all notarized documents. He derives an income from fees received.

NOTRE DAME, *no' tr' dahm,* CATHEDRAL OF. The scene of many important religious and state ceremonies, the Cathedral of Notre Dame is a stately Roman Catholic church in Paris, constructed on an island in the Seine River. It is an outstanding example of Gothic architecture. Unusual features of the cathedral are the two square towers on the west front and the massive flying buttresses which support the roof. The building was begun in 1163, but the structure was not completed until early in the thirteenth century. A restoration of the church was started in the nineteenth century. See CATHEDRAL.

NOUN, a word which stands for a person, thing, or idea. A *proper noun* is the name of a particular person, place, or thing, such as *United States* or *Thomas;* a *common noun* is one of a class of things, such as *boy* or *dog.* A *collective noun* represents a group of similar objects, such as *herd, flock,* or *army. Concrete nouns* always apply to material things, such as *house* or *airplane; abstract nouns* refer to immaterial things or ideas, such as *softness, bravery.* See LANGUAGE AND GRAMMAR.

NOVA SCOTIA, *no' vah sko' shah.* Visited a thousand years ago by Norsemen and later made famous by Longfellow's poem



SALT MINING IN THE MARITIMES
Largest salt mine in Nova Scotia is this modern plant at Pugwash. Canadian salt production has doubled since 1953, chiefly because of growing amounts needed by manufacturers of caustic soda, chlorine, and other chemical products.

Morton Salt Co.

Courtesy Canadian National Railways

FLYING FISH?

No, these are shad, being harvested from a gill net with the aid of a ladder and wagon. They were caught at high tide in the Bay of Fundy, which has the highest tides in the world. Fishing is a leading industry of Nova Scotia.

Evangeline, Nova Scotia, one of the Maritime Provinces, lies at the eastern end of Canada. It stretches out into the Atlantic Ocean as a peninsula; included in its territory is Cape Breton Island. The province has an area of 21,068 square miles and a population of about 716,000.

The Land and Climate. Except for the narrow strip of land connecting it with New Brunswick, Nova Scotia is surrounded by water, with the Atlantic to the east and south, the Bay of Fundy to the west, and the Gulf of Saint Lawrence to the north. The long, irregular coast provides a number of fine harbors. The southern half of Nova Scotia consists of rocky, hilly land; beyond stretches a plain dotted with hills and forests and cut by river valleys. The North and the Cobequid Mountains are found on the shores of the Bay of Fundy. Nova Scotia has only one important river, the Annapolis, which drains the southwestern portion. The numerous other rivers are not much more than short streams.

Because of its location by the sea, Nova Scotia has a moderate climate, free from extremes of both heat and cold. The average rainfall is about forty-five inches.

Natural Resources. Nova Scotia is rich in minerals, the most important of which is coal. In fact, the coal deposits are among the largest in North America, and coal constitutes one of the province's chief exports. There are also large quantities of gold, salt, gypsum, iron ore, and manganese. Other minerals include antimony, tin, zinc, and limestone.

The fisheries of the province are the second largest in Canada, ranking next to those of British Columbia.

Industries. Agriculture is the most important industry, the leading crops being hay, wheat, oats, barley, and potatoes. The raising of livestock is also important, as is the dairy industry. Apples and other fruits are grown extensively, particularly in the Annapolis Valley.

Among the manufacturing industries, the production of iron and steel, lumber, and foundry products and shipbuilding are the most important. The forests support a considerable logging industry. There is also some fruit canning and manufacturing of cotton goods.

Government and Education. Nova Scotia is governed by a lieutenant-governor, who is appointed by the Governor-General of Canada. The legislature, called the house of assembly, is composed of thirty members elected by popular vote to five-year terms. Halifax is the capital of the province.

In charge of education in the province is a council of public instruction, headed by a superintendent of education. There is an academy or high school, as well as several public schools, in every county. There is no public university, but the province maintains one normal college. There are several denominational colleges and universities, the most famous being Dalhousie University, at Halifax.

History. The first colonization was by the French in 1604. The French ruled Nova Scotia and New Brunswick as one province under the name of Acadia. The territory changed hands several times between the British and French during the seventeenth and early eighteenth centuries. But in 1713 Great Britain gained permanent possession, and in 1755 the French were driven from their homes, as told in Longfellow's famous poem. Nova Scotia became a separate province in 1784. In 1848 Nova Scotia set up its own government, and in 1867 it became a part of the Dominion of Canada. See ACADIA; CAPE BRETON; EVANGELINE; HALIFAX.

NO'VAYA ZEMLYA'. In the Arctic Ocean off the Russian coast are two barren uninhabited islands called Novaya Zemlya, which belong to Russia. The islands abound in wild animals such as bears, wolves, reindeer, and ermine which feed on the scanty grass and shrubs growing in the interior. Fish, seal, and waterfowl are plentiful in the waters that surround the islands. Novaya Zemlya has a total area of about 35,000 square miles and is separated from the Russian mainland by the Kara Strait. The islands are practically valueless except for the hunting and fishing that attract Russian sportsmen.

NOVEL. Probably the most popular form of reading today, the novel is a relatively young member of the literary family. It is a story in prose, a narrative woven about a plot or theme, and is presented in more extended form than the short story. Defoe's *Robinson Crusoe,* published in 1719, is the first English book in prose with a continuous narrative; it is the first English novel of adventure. Samuel Richardson's *Pamela,* which appeared in 1740, is the first English prose tale of book length containing all the elements of the modern novel—plot, characterization, and romance.

Because authorities differ as to the exact definition of the novel, the term is often qualified. Some hold that a true novel requires a love theme, which books like *Robinson Crusoe* lack. The novel should have a plot, yet most of those of Dickens and Thackeray were loosely constructed and often too intricate to be "boiled down" into a single plot; but these stories do have a continuous main thread of narrative, with many threads interwoven.

It is generally agreed that the novel should present a story of true characters, as distinguished from the fairy story or the romance built around unreal persons and happenings. Sometimes the novel and the romance are mingled. The books of Sir Walter Scott are variously described as historical romances or romantic novels; they weave romantic, unreal adventurous plots against an historical background involving real persons. They are not true character novels.

For biographies of some of the writers of various forms of the novel, consult the following titles:

Annunzio, Gabriele d'
Austen, Jane
Barrie, James M.
Brontë, Charlotte
Bulwer-Lytton,
  Edward
Cervantes Saavedra,
  Miguel de
Clemens, Samuel L.
Cooper, James F.
Defoe, Daniel
Dickens, Charles
Disraeli, Benjamin
Doyle, Arthur Conan
Daudet, Alphonse
Dumas, Alexander
Eliot, George
Galsworthy, John
Garland, Hamlin
Gorky, Maxim
Grey, Zane
Hardy, Thomas
Harris, Joel Chandler
Hawthorne, Nathaniel
Holmes, Oliver W.
Howells, William D.
Hugo, Victor M.
Ibanez, Vicente B.
Kipling, Rudyard
Meredith, George
Scott, Walter
Stevenson, Robert L.
Thackeray, William M.
Tolstoi, Lyoff

NOVEM'BER. Marked by gay Thanksgiving celebrations, by the last glow of autumn and the first foretaste of winter, November is the eleventh month of our calendar year. It was the ninth month of the Roman year, the name being derived from the Roman word *novem,* meaning *nine.* The reform of the Roman calendar added two extra months to the year; November thus became the eleventh month, although the old name was retained.

There have been several changes in the number of days in this month, but it has had thirty days since the time of the Roman emperor, Augustus. The most important November celebration is Thanksgiving, observed on the last Thursday of the month. The chrysanthemum is the flower of the month; the gem, topaz.

NU'BIA. Peopled by handsome, dark-skinned natives who belong to the Arabic and Ethiopian races, Nubia is a region of Northeastern Africa. It is bounded on the north by Egypt, on the east by the Red Sea, on the south by Khartoum, and on the west by the Libyan Desert. It is a part of the Republic of the Sudan and is not a separate political division. The territory, except for the fertile valley of the Nile, is largely desert.

NULLIFICA'TION. At various times in the history of the United States, states have declared the right to suspend or make null and void Federal laws at their discretion. The right of nullification is based on the theory that the Union is a compact among sovereign states which have the right to protect their independence from infringing laws. The Kentucky and Virginia Resolutions of 1798 first expressed this claim, and about ten years later, Pennsylvania asserted a similar opinion. The state of Georgia in 1825 succeeded in carrying out this doctrine in regard to jurisdiction over Indian lands.

The arguments concerning nullification became most heated during the tariff controversy in Jackson's administration. John C. Calhoun, in 1828, wrote an essay entitled *The South Carolina Exposition* which stated that each state was sovereign, that the Federal government was only its agent, and that the state had a right to withdraw the authority granted to its agent and to suspend laws which the Federal Congress had passed. The same argument was used by Robert Y. Hayne, Senator from South Carolina, in his debate with Daniel Webster in 1830.

In 1833 South Carolina refused to recognize the tariff acts of 1828 and 1832 because the acts harmed the South. Secession was threatened if the United States attempted to enforce the law. Jackson retaliated by having Congress pass the Force Bill in 1833, giving him authority to use military force to compel observance of the law. Further trouble was avoided by the passage of a compromise tariff act, and the nullification measures of South Carolina were withdrawn. The Civil War settled the question once for all, and nullification is no longer a threat to national unity. See KENTUCKY AND VIRGINIA RESOLUTIONS.

NUMBERS. See ARITHMETIC.

NUMBERS, BOOK OF. So named because it records the census which God commanded Moses to take of the tribes of Israel, the *Book of Numbers* also contains an account of the journey of the Israelites from Sinai to the plains of Moab. It also contains parts of the Mosaic Law. The authorship of the book was once attributed to Moses, but modern scholars believe that the book is the work of several authors.

NUMISMAT'ICS. Almost every person has at some time during his life made a hobby of collecting coins. A coin collector is a numismatist, and the study of the artistic, historical, and economical value of medals and coins is numismatics.

Take an ordinary coin from your pocket; it probably holds no special attraction for you, certainly not one which would cause you to want to keep it permanently. It does, however, have some interesting aspects. The side which bears a head, bust, or some figure, possibly a national emblem, is called the *obverse.* The opposite side is known as the *reverse.* Around the outer border of the coin is perhaps some printing, the *legend*. The *inscription* is the writing in the center portion, or *field*, and the space beneath the design, which usually bears the date, is the *exergue*.

Foreign coins are often very instructive and attractive. For instance, on the coins of Egypt have appeared pictures of animals —the crocodile and the ibis; on those of several African states, the elephant; and on Arabian coins, the camel. Sometimes the history of a country can be traced by its coins; and a gallery of contemporary and recent rulers of the world can be acquired with a simple collection of coins. As a rule, most coins are circular; but in times past they have appeared in various shapes, and some have been rather beautiful in appearance, particularly the finely sculptured Greek coins of the fourth century B. C.

Collections of coins are many times very valuable, and individual pieces of rarity bring large sums in public sales. There are numerous companies which specialize in the sale of coins and equipment for collectors.

NUN. In the Roman Catholic Church, a woman who joins a religious order and takes solemn vows to spend her life in devotion and service is called a nun. The first nunnery is thought to have been established about the middle of the third century; the first in England was founded about 400 years later. Some of the principal orders of nuns are the various Franciscan, Benedictine, Dominican, and Carmelite congregations and the Ursuline nuns. See MONASTICISM.

NUNCIO, *nun′ she o.* Representing the Pope at the court of a foreign sovereign, the nuncio is an ambassador of the first rank, although not a cardinal. An ambassador of the first rank who is also a cardinal is a legate. A Papal representative at a minor court is an internuncio. At one time Papal nuncios were given supreme religious authority in the districts to which they were sent; but when states are separated from the Church, nuncios serve only as ambassadors.

NUREMBURG, *nu′ rem burg,* GERMANY. Its location on the Pegnitz River, in the center of a great trading area, centuries ago made Nuremburg, in Bavaria, a commercial center of Germany. Because of its location halfway between the Mediterranean and the North Sea, the city was a market for the products of the Orient long before Columbus began his search for a water route to the East. The chief manufactures, in normal times, are chemicals, clocks, engines, toys, and wood and ivory carvings.

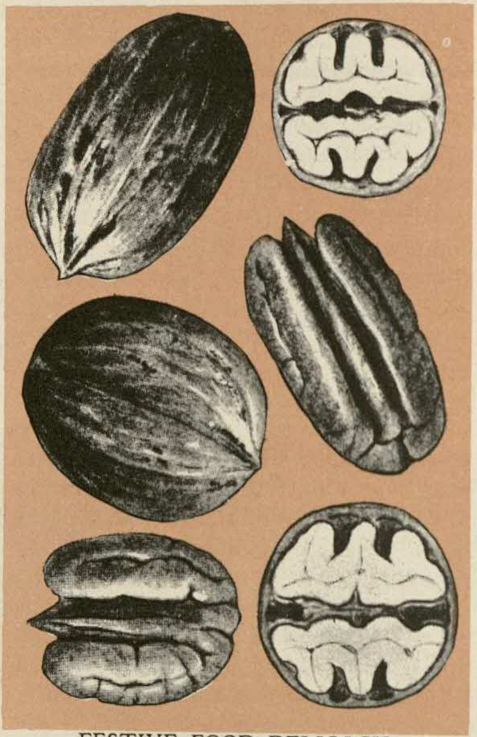
Nuremburg was one of the great cities of Europe during the Middle Ages, and it retained its medieval appearance until World War II. During that conflict the old part of the city was completely destroyed by bombs. Nazi war criminals were tried in Nuremburg after the war. The population is about 430,000.

NURSE. Based on helpfulness, cheerfulness, self-denial, and kindness, the life of the nurse is devoted to caring for the sick, infirm, or disabled, and to the more fascinating work of caring for babies and small children. Nursing is a field dominated almost entirely by women.

Organized nursing had its origin largely in war and religion. Systematic nursing began with the activities of Florence Nightingale of England, who became famous as an organizer during the Crimean War of 1854-56 (see NIGHTINGALE, FLORENCE). The first training school for nurses in the United States was established at Boston in 1872.

Professional nurses are now found in various fields. Some are regular members of hospital staffs; some are "on call," going out on private cases where nursing service is required; many are employed as industrial nurses and are in charge of medical aid in large industrial plants; school nurses make periodic examinations of the children of the schools so that defective eyesight, adenoids, bad teeth, and other afflictions may be discovered and corrected; many are engaged in social-service work; all stewardesses on airliners must be registered nurses.

Training the Nurse. The modern hos-



FESTIVE FOOD DELICACY

Nuts are not only zestful in flavor; they are a nutritious, fat-furnishing element of diet.

pital is the training school for nurses. Courses usually last from two to three years. After a few months' "probation period," in which long hours, few liberties, and hard, disagreeable work form the routine, the candidate knows whether she has or has not the qualifications and desire to continue the training.

If she continues, she learns to assist in operations and masters practical nursing, massage, dietetics, bacteriology, physiology, and anatomy. Each day is divided into periods of work, rest, recreation, and study; and all rules must be strictly obeyed. When the course is completed, the student is awarded a diploma. If she then passes the state examinations, she becomes a Registered Nurse (R.N.) in that state. If she continues in the hospital, she is usually not exceptionally well paid, but all food, lodging, medical care, and laundry are provided. She may, however, prefer to become a private nurse. She would command a higher salary, but such work is usually not steady.

NUT. The first heavy frost that sweeps across the northern part of the United States in the fall sends armies of boys scurrying off to the woods in search of nuts. For then walnuts, butternuts, beechnuts, hickory nuts, chestnuts, and hazelnuts are ripe and ready for picking. But this does not mean that they have to be eaten immediately; the hard shell protects the one-seeded nutmeat within for a long time. As a matter of fact, many nuts are better flavored if not eaten until the shells are thoroughly dried.

The peanut, which grows under the ground, is not properly a nut, but belongs to the legume family, along with beans and peas. The coconut, though hard-shelled, is likewise not a nut, but a stone fruit. But the acorn, which is usually inedible, is a true nut.

Among the important cultivated nuts are the pecan, almond, and English walnut. Pecans are raised all along the Gulf of Mexico and in some other Southern states; almonds and English walnuts are grown chiefly in California. Nuts are valuable as food, for they contain considerable fat and other nutritive substances.

Consult the following titles for additional information.

Almond
Betel
Brazil Nut
Butternut
Chestnut
Coconut
Hazel
Hickory
Peanut
Pecan
Pistachio
Walnut

NUT′CRACKER. This is a bird of the mountainous regions of Western North America. It belongs to the crow family, and is about the size of a small pigeon. It is gray in general color, with some black and white on the wings and tail. For food it depends largely on the seeds of evergreen cones, often holding the cones tightly in its claws while pecking at them. Besides these, the nutcracker eats seeds, berries, and insects. The nest, in an evergreen, is built of twigs and bark. In it are laid three to five greenish, brown-marked eggs.

BIRD WITH "TWO-WAY" CLAWS

NUT'HATCH. Most people who know the nuthatch think of it as an "upside-down" bird, for it has the rare habit of creeping head downward as easily as any other way. It is always busy searching the trunks and larger limbs of orchard, shade, and forest trees for insects and their eggs and larvae, hidden under the bark.

The common species in North America is the *white-breasted* nuthatch, resident all the year round in the United States and the southern part of Canada. It is about six inches long, blue-gray above, changing to black on the neck and crown and white below. The bill is as long as the head and is sharp-pointed. The tail is square-cut, showing some white on the outer edges. As the bird climbs about, it utters a sharp *yank, yank* unlike the note of any other bird.

NUT'MEG. A product of an East Indian evergreen tree, the nutmeg is one of our leading spices. The fruit of the tree is pear-shaped and about two inches in diameter. When it ripens, it splits open, exposing two sections of the seed, or nut, which is jacketed in a red covering, or mace. The flesh of the nut is a wrinkled kernel, the nutmeg of commerce. The mace is also used as a spice.

From the East Indies the cultivation of the nutmeg tree has spread to India, Sumatra, Brazil, and the West Indies. The tree usually reaches a height of twenty to thirty feet and thrusts out a number of branches. The bark is reddish brown, the young branches a brilliant green. Nutmeg has a pleasing taste and smell and is highly valued in cookery. From it is obtained oil of nutmeg, or oil of mace, a transparent fluid of value as a flavoring.

NUTRITION, *nu trish' un.* All that is involved in the upbuilding and repairing of the body tissues and supplying them with energy for their work comes under the head of nutrition. Nutrition may be considered the sum of all the processes concerned in the growth, maintenance, and repair of the living body. We expend much energy continuously in the ordinary activities of life, and to maintain a supply of energy requires a constant oxidation of food. All substances which supply energy for the activities of the body, or furnish material for its building and repair, constitute the *food* of that body. Any single compound which thus nourishes the body may be considered a *foodstuff,* or a *nutrient.*

For further information, see:

Absorption
Calorie
Cooking
Diet
Digestion
Food
Home Economics
Vitamins

NYASA, *nyah' sah.* Located in Southeastern Africa, Nyasa is a large lake about 350 miles long, 45 miles wide, and 14,000 square miles in area. It is situated on a high plateau more than 1,500 feet above sea level and is drained to the south by the Shire River, a part of the Zambezi system. The lake, which is fresh water and abounds in fish, was discovered in 1859 by Livingstone. Its shores are dotted with missions and trading posts, and a highway connects it with Lake Tanganyika.

NYLON. See Silk, Substitute.

NYMPHS, *nimfs.* In ancient Greek mythology there were many nymphs, beautiful maidens, always young, though not immortal, who presided over the world of nature. Many of them were supposed to have married mortal men. Those living in the sea were *nereids;* those ruling the mountains were *oreads;* those in charge of springs, brooks, and rivers were *naiads;* and those dwelling in woods and trees were *dryads* or *hamadryads.* See Dryads; Naiads.

O ◆ Symbol of an eye to the ancient Phoenicians, the letter *O*, the fifteenth in our alphabet, has remained practically unchanged through history. Some of the Greeks at one time did put a dot in the center, but this form was discontinued by the Romans. The Greeks, however, used the *O* familiar to us only for the short sound of the letter and called it *omicron*. They indicated the long sound with the letter called *omega,* which was written Ω.

OAK, *oke*. Though not the most beautiful or most symmetrical tree in the forest, the oak is one of the most rugged. Often called "monarch of the woods," it is noted for the hardness of its wood, its slow growth, and its great age, and because it is the only tree that bears an acorn. Its heavy, gnarled limbs stretch out in every direction from its trunk; its sturdy roots burrow deep into the earth, defying all but the most vicious storms. The leaves of the oaks vary widely. Those of some species are deeply notched, others are smooth-edged; all grow alternately on the twig.

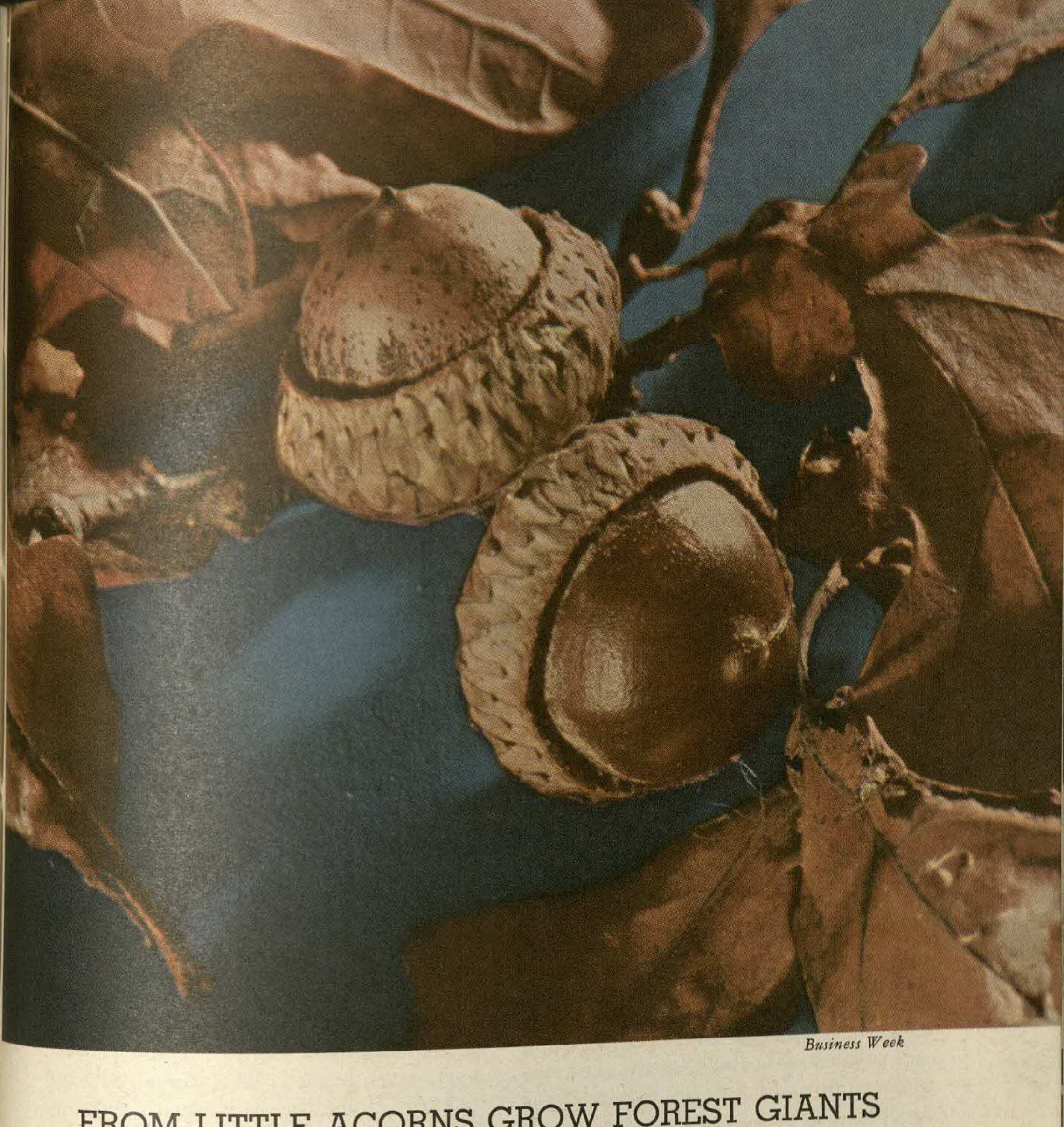
Oak wood is so popular that the supply of this timber is rapidly diminishing. A hard, beautiful wood, it is much used for flooring, furniture, barrels, railroad ties, fence posts, and heavy piling. Though the leaves have no commercial use, they are often the central theme of decorative designs. The fruit of the oak, the acorn, is seldom eaten by people, but is a valuable hog food. Oak bark is a rich source of tannin, so important in the manufacture of leather. The tree is also used for shade and ornament.

Over 250 species of oaks are found in North America, South America, and Central America, but few members of this great family are found in Europe. The *white* oak, America's most important species, is scattered from Canada to the Gulf of Mexico. The *red* oak covers the same areas, and its wood is also valuable. The *bur* oak is a small species, of little value except for firewood. The *live* oak, another valuable timber producer, is a native of the South, and is found growing as far north as the Virginia coast. Important Old World species include the *British* oak, similar to the white oak, and the *cork* oak of Spain and Portugal. The bark of the latter yields the cork of commerce (see Cork).

OAKLAND, Calif. On the eastern shore of San Francisco Bay is the large manufacturing and commercial city of Oakland, county seat of Alameda County. Lying directly west, six miles across the bay, is the city of San Francisco, with which Oakland is connected by the great San Francisco-Oakland Bay Bridge, as well as by ferry. Oakland is chiefly an industrial city and its many factories produce millions of dollars' worth of goods every year. The chief products are machinery, electrical goods, petroleum products, and canned goods. There are also several large shipyards. An important Pacific port, Oakland has about twenty-five miles of water front lined with docks and wharves. The city is also the terminus for several large railroads. Passengers to San Francisco continue the journey by ferry.

Oakland is a modern city with many large buildings and wide streets. The outstanding structures are the municipal auditorium, the art gallery, three museums, and numerous hospitals and churches. The leading institutions of higher learning are Mills College for women and Saint Mary's College for men.

Oakland was first settled in 1850 by



Business Week

FROM LITTLE ACORNS GROW FOREST GIANTS

The small, oval acorn from which the oak grows is firmly seated in a snug cup. The tough, hard-grained, slow-growing tree often reaches a height of more than a hundred feet, and may have a trunk fifteen feet thick. Many oaks have lived 200 years, some nearly 1,000.

Moses Chase, who obtained a tract of land from a Spanish nobleman. The town was incorporated in 1852 and was chartered as a city two years later. Steamship transportation was established soon afterward. Oakland's population is about 368,000.

OAKUM, *o′ kum*. Finely divided rope fiber is impregnated with tar to make oakum, a calking material. It is used to stop cracks between timbers, as in the hulls of wood ships and boats; and also to make tight joints where pipes, masonry, or other rigid material must be sealed.

OASIS, *o a′ sis*. Toward the end of a very dry season, when nearly all the lawns and meadows are dry and brown, one may find the grass still green around springs or along stream banks. Oases in deserts are the result of the same conditions—the existence of water supplies. An oasis may be on the windward side of a mountain, which is high enough to condense the moisture brought by the wind, or around springs, artesian wells, or underground rivers.

Since most desert oases occur in warm latitudes, it is possible, with a water supply, to produce several crops in one season. For that reason, man was able in ancient times to make more rapid advance in such provident regions. The Nile Valley is really a long oasis of the Sahara, and the Tigris-Euphrates Valley is an oasis in the margin of the Arabian Desert. These places supported civilizations, far advanced in culture, before there was any such progress in Europe (see CIVILIZATION).

Oases furnish stations for desert commerce, because water may be obtained there, and commercial products exchanged. The date palm especially thrives in the oasis, where conditions of great heat and great moisture prevail.

Many desert oases have areas of over a thousand square miles; the Kufra oases in the heart of the Libyan Desert of Northern Africa are collectively as large as the states of Connecticut and Rhode Island together. They support more than 5,000 people and over a million valuable date palms.

OATH. Any solemn pledge given orally, and strengthened by calling upon a deity to witness it, is an oath. In law, witnesses on oath swear that they will tell the truth, the whole truth, and nothing but the truth. If they fail to do so, they are guilty of perjury. Those not willing to take an oath because of religious scruples, can affirm that they will give honest testimony, and are bound by such affirmation.

Every Federal or state executive from the President down is required to take oath of office, swearing to uphold the Constitution. Soldiers take a military oath when they are "sworn in."

OATS. The steaming bowl of oatmeal that is an important dish on America's breakfast table is a product of a field of waving, golden grain known as oats. Ranking third in importance among the nation's grains, it is not only a popular table cereal, but is also an important fodder crop, being especially valuable as a food for horses.

Like corn, rye, and wheat, the oat plant is an annual grass. The roots of the plant are small and numerous, and may penetrate into the ground for several feet. The plant sends up from three to five hollow stems, about one-eighth inch in diameter and from three to five feet tall. The leaves are long and pointed. The grain grows on small spikelets, with two or three grains on each one; and from 20 to 150 of these spikelets make up the head. The kernel is wrapped within a hull.

Growing best in a cool climate where there is an abundance of moisture, oats are scattered broadcast or drilled into the ground. The field is then disked to break up the topsoil. The sowing usually takes place in the spring, although in the warmer states good results are often obtained with winter oats. They reach maturity late in July and ripen soon after the wheat crop. They are then cut with a binder, and "shocked" in the field, where they completely ripen before thrashing time arrives. Thrashing usually takes place in late August or September.

The weight of a bushel of oats in most states is thirty-two pounds. The yield per acre varies from twenty to eighty bushels, but in the United States the average is about twenty-seven bushels. The annual yield of the entire United States is usually about a billion bushels. Leading states in the production of the crop are Iowa, Illinois, Minnesota, Wisconsin, and Ohio.

OBELISK, *ob' e lisk.* A slender, four-sided column capped by a pyramid, the obelisk was first erected by the ancient Egyptians in honor of their sun god. These shafts, cut from a single piece of granite and then highly polished, are inscribed with hieroglyphics.

Because of their slenderness, some of these obelisks have been termed *needles.* Two of the most famous of such obelisks are Cleopatra's Needles, which originally stood at Heliopolis. One now stands on the Thames Embankment, London, and one in Central Park, New York City. Both shafts were gifts of the Egyptian khedive. The New York obelisk is sixty-nine feet high and seven feet, seven inches square at the base. It weighs 200 tons. Other obelisks are one in the Place de la Concorde in Paris and one which stands before the Church of Saint John Lateran in Rome.

OBERAMMERGAU, *o bur ahm′ mur gow.* This tiny village in Bavaria, Germany, is known worldwide for the performance, once every ten years, of the Passion Play — the story of Christ's crucifixion and ascension. See PASSION PLAY.

OBOE, *o′ bo.* Producing beautiful, penetrating tones over a wide range, the oboe, a double-reed wood-wind instrument, is one of the most important orchestral instruments. It is composed of three sections, or joints, forming a tube about twenty inches long, which has the reed at one end and terminates in a bell-shaped opening at the other. It is usually made of boxwood, ebony, or rosewood. Inside the wooden tube a smaller brass tube is fitted into the mouthpiece. By means of a series of openings in the upper and middle sections, the player opens and closes the holes in the instrument to produce the tones.

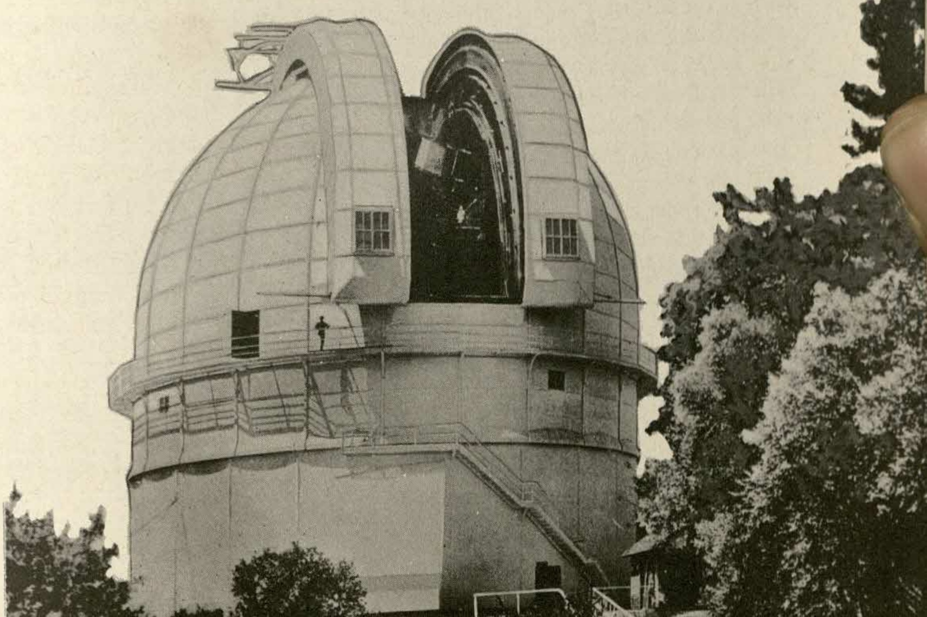
OBSERV′ATORY. The movements of stars, planets, and other heavenly bodies are studied in observatories, which house telescopes and other scientific instruments used in astronomy. Observatories may also be used to note other phenomena of the universe, such as magnetic forces and weather conditions. The building must be solidly constructed and the instruments kept free from motion to permit the necessary delicate observations. Often the instruments rest on the foundation of the building, out of contact with the walls. Besides telescopes, the equipment includes such apparatus as transit instruments and sidereal and solar clocks.

In 1472 Regiomontanus and Bernhard Walther built the first European observatory at Nuremberg, Germany. About 1580 Tycho Brahe, one of the greatest of all astronomers, established an observatory on

FOR A LONG LOOK INTO SPACE

Observatories can usually be recognized by their domed tops with movable sections to expose the telescopes. Very large telescopes are necessary to study the action of faint and distant stars. In 1919, when the Mount Wilson observatory, below, was built, its 100-inch telescope was the largest reflecting telescope in the world.

Los Angeles Chamber of Commerce



the island of Hven, once part of Denmark, but now belonging to Sweden.

Among the outstanding American observatories are Yerkes Observatory (belonging to the University of Chicago) with a forty-inch refracting telescope, at Williams Bay, Wis.; the Lick Observatory at Mount Hamilton, Calif. (belonging to the University of California); Carnegie Institution Observatory at Mount Wilson, near Pasadena, Calif.; Lowell Observatory at Flagstaff, Ariz.; Astrophysical Observatory at Washington, D.C.; and the Mount Palomar Observatory (directed by the California Institute of Technology), with a 200-inch reflecting telescope. See GREENWICH, ENGLAND; NAVAL OBSERVATORY; TELESCOPE.

OCEAN, *o' shun,* or **SEA.**

> There is no limit to thy strength, no end
> To thy magnificence. Thou goest forth
> On thy long journeys to remotest lands,
> And comest back unwearied.
> —From Stoddard's *Hymn to the Sea.*

The vast expanse of ocean, covering nearly three-fourths of the surface of the globe, is commonly divided into five great areas, or individual oceans. But they are all connected into one vast mass of water. The five are known as the Pacific, Atlantic, Indian, Arctic, and Antarctic oceans. The last two named, however, are usually considered as continuations of the Pacific, Atlantic, and Indian oceans.

The total area of the ocean is about 140,000,000 square miles. Nearly half of this area is included in the Pacific Ocean, separating Asia and Australia from the American continents. The Atlantic Ocean, about half the size of the Pacific, separates the Americas from Europe and Africa. The Indian Ocean, next in size, extends southward from Asia. Smallest of all are the oceans of the Arctic and Antarctic.

Wherever a continental shelf exists, its margin, rather than the shore line, is considered as the edge of the ocean. From it extend the continental slopes and then the deep-sea floor. As one goes seaward from the American Atlantic coast, the water is comparatively shallow for 100 miles or more, then deepens abruptly.

The depth of the ocean is determined by soundings made by oceanographers. The average depth is about two and a third miles, with the deepest point of 35,800 feet in the Challenger Deep of the Pacific Ocean off the island of Guam. In 1960, the bathyscaph "Trieste" made its record-breaking dive into this depth where the pressure reaches almost seven tons per square inch.

Although the bottom of the ocean has its plateaus, canyons, and mountain chains, much like those on the continents, the ocean beds, in general, are much smoother. The undersea terrain is not subjected to the forces of erosion, such as wind, rain, and ice. Some volcanic sea mountains break through the water's surface and form islands. Thus many ocean islands, such as the Hawaiian Islands, are the tops of the highest volcanic mountains. Some rise 30,000 feet above the ocean floor, extending 14,000 feet above the water's surface.

The surface of the sea floor is being continually built up by deposits brought by the rivers, the winds, the rains, the waves, and the currents carrying rock wastes, by meteors, by volcanoes, and by a constant rain of the remains of sea life as they die and sink to the bottom. Here these materials are gradually made over into rock—sandstones, limestones, and shales. The fossil remains of sea life in many of the rocks on land, even on high mountains, show that the rocks were originally formed under the sea.

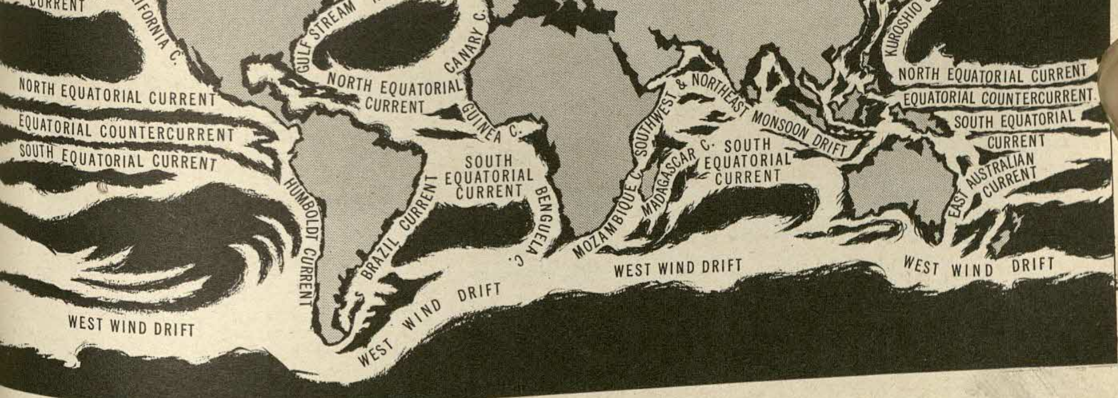
The rivers running to the sea carry to it minerals which they have dissolved from the rocks, especially limestone and salt. When sea water evaporates, the minerals are left behind, with the result that the oceans contain much solid matter in solution. Many sea animals, such as coral polyps, clams, and oysters, use the lime to build their skeletons. When these animals die, their shells help to build up the limestone being formed at the bottom. Their activity, by reducing the lime in solution, and evaporation, by reducing the water, leave the proportion of salt unusually large.

Courtesy of A. Aubrey Bodine and Bethlehem Steel Company

THE OCEAN—GREAT STOREHOUSE OF THE WORLD'S RICHES

A wealth of food and minerals is held in the ocean's waters—most of it available just for the taking. But some sea foods, such as oysters, are very carefully tended. Maryland law requires that oysters be dredged by sailboats, and the state's workboat sail fleet is the largest in the United States.

CHIEF OCEAN CURRENTS OF THE WORLD



One hundred pounds of sea water contain on an average two and two-thirds pounds of common salt.

The oceans furnish most of the water vapor of the atmosphere; there it is converted into rain and snow. The seas change in temperature much more slowly than the land (the difference between greatest annual extremes on the ocean being less than one third that known on land), so that winds from the sea cool in summer and warm in winter the lands over which they blow. As a storehouse of food, the oceans are of increasing importance, yielding, it is estimated, about 15,250,000 metric tons (or 16,710,000 short tons) of sea food annually.

The oceans are also the world's greatest highways, and access to them is necessary for the development of great nations.

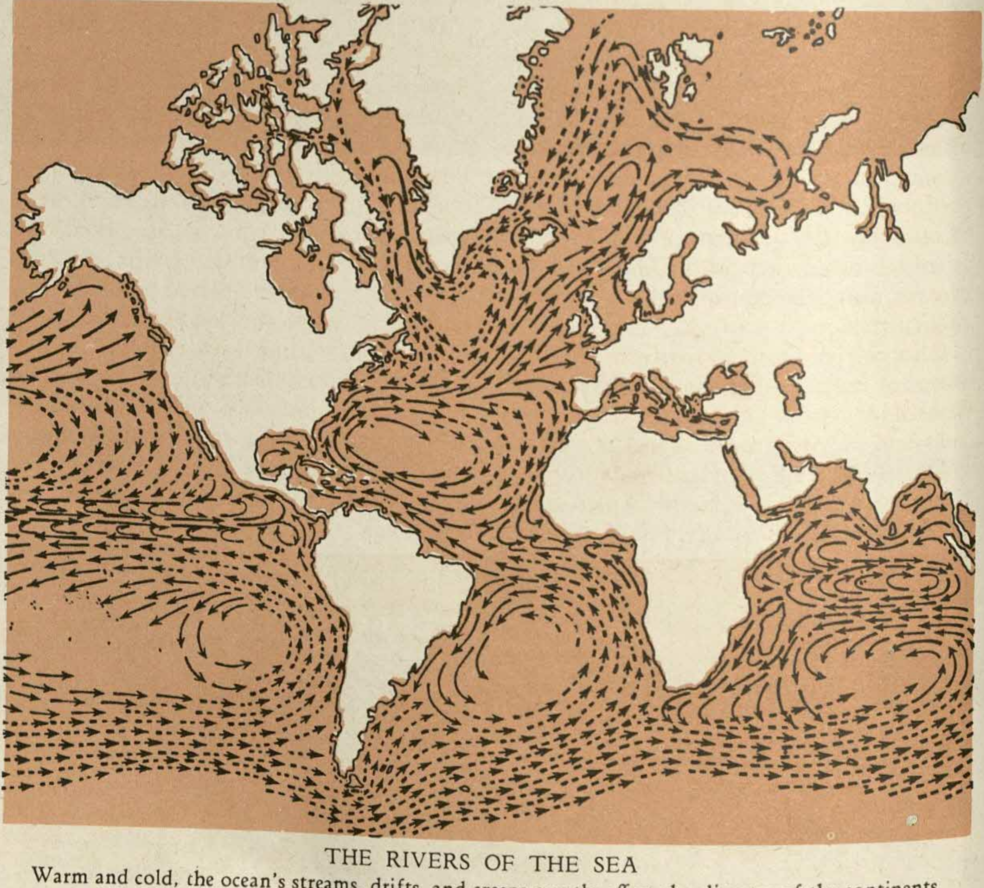
For descriptions of the oceans, consult the following articles:

Antarctica	Atlantic Ocean
Arctic Ocean and Lands	Indian Ocean
	Pacific Ocean

OCEAN CABLE. See CABLE, SUBMARINE.

OCEAN CURRENTS. In the valleys of British Columbia the farmer harvests his bountiful crops of apples, while directly east of him, on the bleak coast of Labrador, agriculture is scarcely known. And in the course of a year's time the Oregon orchard may have over sixty inches of rain, while one in New York is getting less than thirty. These differences are due in part to ocean currents.

The trade winds blowing toward the equator from 30°N. and 30°S. Lat. tend



THE RIVERS OF THE SEA
Warm and cold, the ocean's streams, drifts, and creeps greatly affect the climates of the continents they approach.

to drift the waters along the equator in a westerly direction. The westward movement of this current, checked by the continents, divides and drifts north and south. The northward movement enters the Caribbean and the Gulf of Mexico, emerges at the Florida Straits as the Gulf Stream, and, passing up the east coast of the United States, comes under the influence of prevailing westerly winds. Swinging eastward south of Newfoundland, as the Gulf Stream drift, it divides west of Europe, the major portion turning south and coming again to the equator. Similarly, the current which turned south on the east coast of South America completes its circuit in the South Atlantic.

Currents moving away from the equator carry much heat into higher latitudes. Agriculture is practiced in Western Europe within the Arctic Circle, chiefly because the region lies on the leeward side of a large ocean, whose westerly winds modify its climate. However, the warm current aids by making the North Atlantic warmer than it would otherwise be. The same effect is produced by the current in the North Pacific, the Japanese Current. By the time the latter reaches Northern California, however, it would be more properly called a cool current.

Cold currents also move from the cold waters of Polar regions toward the equator. The cold Labrador Current between Greenland and North America, and the Humboldt, or Peruvian, Current moving north along the west coast of South America, are good examples. Their effect on the climate of neighboring regions is, of course, the reverse of that of the warm currents.

Also playing a part in ocean circulation is the north-south rotation of deep-sea currents, set up by the sinking of cold water near the Poles and the rising of warm water in equatorial zones.

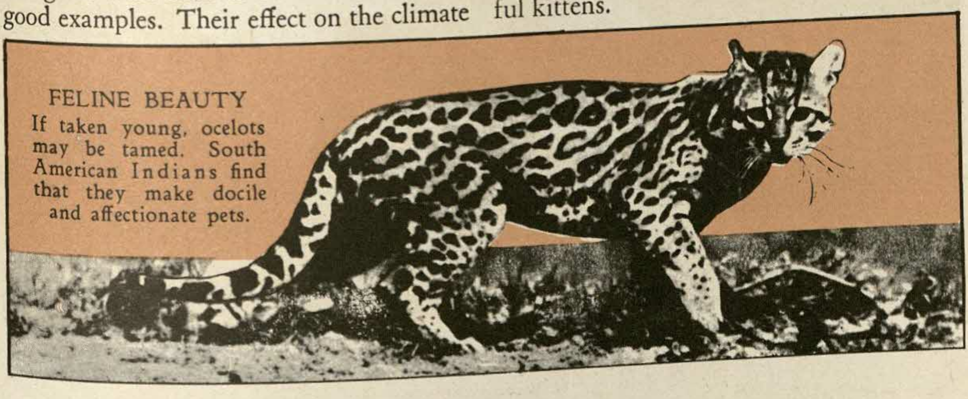
For additional information, consult the following articles:

Gulf Stream	Labrador Current
Kuroshio	Sargasso Sea

OCEANIA, *o she an' ia.* **A great area in the Pacific Ocean, extending from about 20° north to 47° south, is called Oceania.** In this area there are thousands of islands, which are considered parts of various divisions based on differences in race and customs of the inhabitants. The islands include the groups known as Australasia, Melanesia, Micronesia, and Polynesia.

OCELOT, *o' se lot.* This wild, medium-sized member of the cat family has a very limited range in the United States, being confined to wooded regions in Southern Louisiana and Texas. It occurs southward through Mexico to the tropics and throughout much of South America. The general color is tawny or yellowish, splotched with rounded, black markings on legs and body. Streaks of a blackish color occur on the head and neck, while the long, slender tail is conspicuously banded with black.

Ocelots prowl about at night seeking their prey, which consists of wild birds and domestic poultry, mice, rats, rabbits, and a great variety of reptiles and insects. The ocelot's litter usually consists of two playful kittens.



FELINE BEAUTY

If taken young, ocelots may be tamed. South American Indians find that they make docile and affectionate pets.

O'CONNOR, THOMAS POWER (1848-1929), often called TAY PAY, was a prominent Irish journalist and nationalist. He was known as the "Father of the House of Commons," in which he was a member for forty-nine years. O'Connor was born at Athlone, Ireland, and was educated at Queens College, Galway. He started his career on a Dublin newspaper, later founding his own papers, the *London Sunday Sun, T.P.'s Weekly,* and the *Star.* He visited the United States several times to raise funds for Irish independence.

OCTA'VIUS, or **OCTAVIA'NUS.** See AUGUSTUS.

OCTO'BER, the tenth month of our year. In the old Roman calendar, October was the eighth month. Its name comes from the Latin word *octo,* meaning *eight.* But when Julius Caesar added two months to the calendar, October became the tenth month. It has thirty-one days. October brings the celebration of Columbus Day on the twelfth day and Halloween on the thirty-first day. The flower of the month is the hop blossom; its gem, the opal or tourmaline.

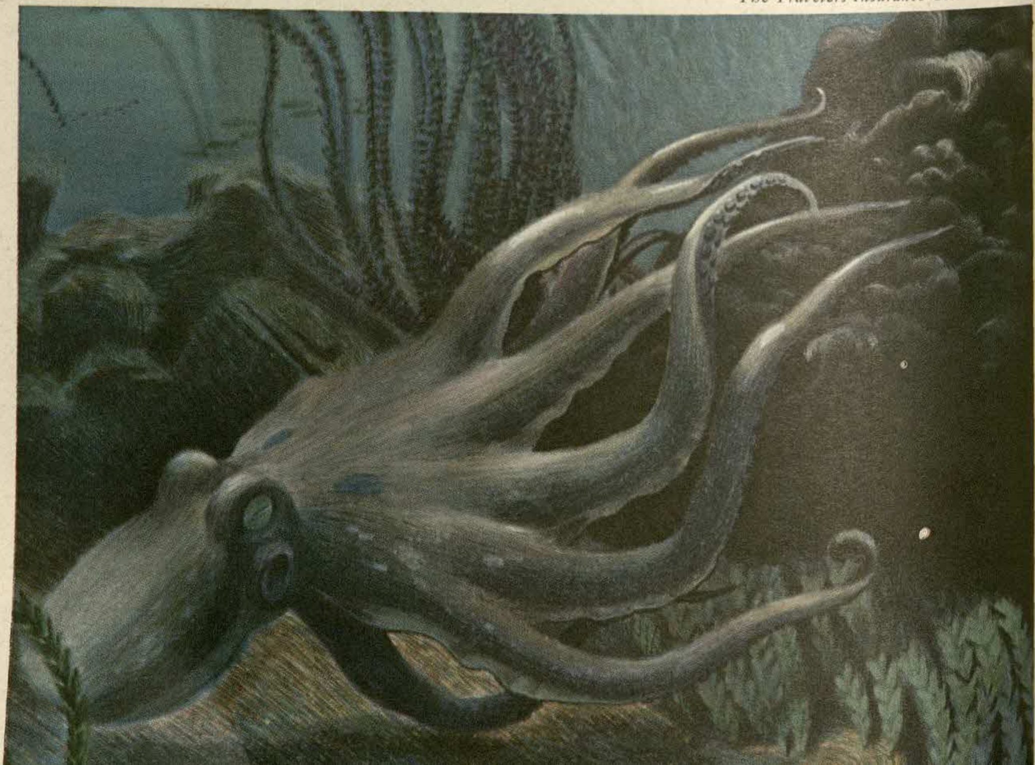
OC'TOPUS, a deep-sea animal with a pear-shaped body about a foot in diameter. There are eight, snaky arms, each of which has a double row of sucker discs. The octopus breathes through gills. It moves about by drawing water into an opening, or *siphon,* in its head, then discharging it through a funnel-like opening. Its average weight is sixty pounds. Found in warm seas, it feeds on crabs, lobsters, and other small animals. It is a favorite food in several countries and is sometimes canned. See CUTTLEFISH; NAUTILUS; SQUID.

ODD FELLOWS, INDEPENDENT ORDER OF, is one of the large secret fraternal societies. The major purpose of the organization is to give assistance to its ill or distressed members. Sick and death benefits are usually provided, but there is

SMOKE SCREEN MONSTER OF THE DEEP

Though the eight tentacles and parrotlike beak of the octopus are a peril to small fish, the octopus must often flee from such large fish as the barracuda. To do this, the octopus releases an inky cloud that hides it from attackers and allows it to scoot away to safety.

The Travelers Insurance Co.



no life-insurance system as part of the order. It was originally founded in England, probably in the eighteenth century. An American organization began in Baltimore in 1819, as a branch of the Manchester Unity Odd Fellows. In 1843 it severed connection with the English order and became the American Grand Lodge, with power to create member lodges in all parts of the world. The organization now has a reported membership of nearly 3,500,000.

The Rebekah Lodge, with a membership of over a million, is the affiliated women's organization and was founded in 1851. See FRATERNAL SOCIETIES.

ODE. One of the most ancient of poetic forms is the ode, brought to its highest perfection in the English language by Milton, Wordsworth, Keats, and Shelley. It is a dignified lyric poem, inspired by some lofty theme and written with intense and sincere feeling.

Any lyric poem adapted to singing was termed an ode by the Greeks, who counted Pindar, Anacreon, Sappho, and Alcaeus their greatest writers of this form of verse. Among the Romans, Horace was outstanding. The early English writers followed the style of Pindar, as in Dryden's *Alexander's Feast;* later, the ode was unfolded in a more regular form of stanzas, exemplified by Shelley's *To a Skylark.*

In addition to those mentioned, the great English writers of odes were Collins, Gray, and Coleridge. The finest odes in the English language include, besides the two named above, Wordsworth's *Ode to Duty* and *Intimations of Immortality;* Tennyson's *Ode on the Death of the Duke of Wellington;* Bryant's *To a Waterfowl;* Shelley's *Ode to the West Wind* and *To Liberty;* Keat's *Ode to a Nightingale* and *Ode on a Grecian Urn;* and Lowell's *Commemoration Ode.*

O'DIN, or WO'DEN. Powerful and cunning, a magician and a poet, Odin reigned as god over heaven and earth, according to Norse mythology. His wife was named Frigg, or Frigga, and his two sons were Thor and Balder. Odin, it was said, could not be everywhere at the same time; so, from his throne in Valhalla, he sent out ravens which flew over the earth each day and brought back the news of events on earth.

In addition to appearing in countless viking and German legends, he is a leading figure in the Wagnerian *Nibelungs* operas. In German stories he is called Woden, or Wotan. Warriors of Northern Europe believed that if they were brave fighters, at death they would be carried to Valhalla by Odin's maidens, the Valkyries.

ODYSSEUS, *o dis' use.* See ULYSSES; ODYSSEY.

ODYSSEY, *od' i si.* The adventures that befell Odysseus (Ulysses) on his return to his home in Ithaca, after the Trojan War, are chronicled for us in the *Odyssey,* an ancient Greek epic attributed to Homer. So well known are his heroic struggles that phrases describing incidents in his wanderings, such as his escape from the Sirens and from Scylla and Charybdis, have become familiar figures of speech.

Shipwrecked on the coast of Thrace, Odysseus lost many of his men in looting the city of Ismarus. But he put to sea again, and storms drove him to the land of the lotus-eaters and thence to Sicily, island home of the Cyclops, son of Neptune. Odysseus and a dozen followers invaded the cave of the one-eyed monster Polyphemus, who devoured six of the men; but Odysseus plied Polyphemus with wine until he was drunk, then blinded him with a flaming pole, and fled.

From that moment Neptune pursued Odysseus, bent on revenge. His ships were wrecked, all but one; with this one he reached the isle of the sorceress Circe, who turned most of his henchmen into swine. Again Odysseus escaped, successfully passed the island of the Sirens, sailed past Scylla and Charybdis, and met trouble again at Thrinacia on the island of Helios. Because his companions slew sacred oxen there, Odysseus' last vessel was wrecked on its next voyage, and only he escaped.

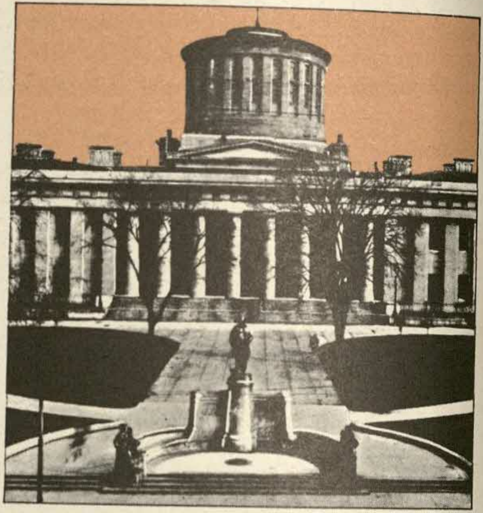
He reached the island of Calypso, lived there eight years, and finally tried to sail home on a raft. But he was hurled ashore by the waves on the coast of Phaeacia and was found by Nausicaa, daughter of the king. Provided with a ship, he sailed to his realm of Ithaca, routed the suitors who were attempting to court his faithful wife Penelope, and regained his kingdom. See HOMER.

OESOPHAGUS, *e sof' a gus.* It is the function of the oesophagus, or gullet, to pass the food we eat from the pharynx to the stomach. The oesophagus is a slender tube about ten inches long, made up of three layers: an outside muscular coat, an intermediate cellular coat, and an inside mucous coat. The muscular coat always forces food and liquids toward the stomach, even though one may be lying down.

OFFENBACH, *ohf' en bahk,* JACQUES (1819-1880). A French composer of light operas, Jacques Offenbach is best known for his musical stories *The Tales of Hoffmann* and *Blue Beard.* The composer was born at Cologne, Germany, of Jewish parents. In 1833 he enrolled in the Paris Conservatory to study the violoncello. Later he became a member of the orchestra of the Opera Comique and still later was made conductor of the orchestra at the Théâtre Français.

OGLETHORPE, JAMES EDWARD (about 1696-1785). A prominent English reformer and soldier, James Oglethorpe was the founder of the state of Georgia. Born in London, he saw service in the army and later (1722) was elected to the House of Commons. As chairman of a committee to investigate abuses in the practice of imprisoning debtors, he suggested a plan for establishing a colony in North America to which debtors might be sent. In 1732 he received a charter for the colony of Georgia, was chosen governor, and in the following year established the city of Savannah. His terms as governor, which lasted until his return to England in 1743, was characterized by an able, energetic, and liberal administration.

O. HENRY. See PORTER, WILLIAM SYDNEY.



OHIO'S DORIC CAPITOL
The state administrative building in Columbus.

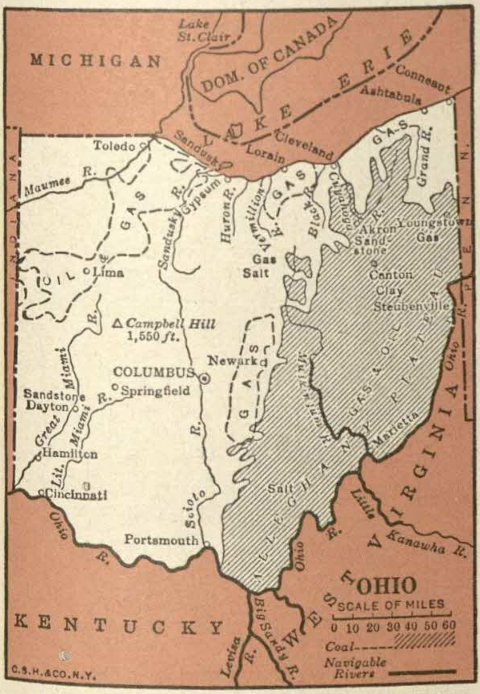
OHIO. Long before the Indians roamed the forests and plains of Ohio and the white man discovered the richness of its soil and the vastness of its mineral resources, Ohio was inhabited by a race of prehistoric people known as the Mound Builders (see MOUND BUILDERS). Warring Indian tribes were there when the white man arrived, but nevertheless pioneers began to filter in, attracted by the natural wealth of the land. One of Ohio's advantages is that it lies across the natural east-west route of travel, and its central location gives easy access to all parts of the country. So quickly was Ohio settled that it was the first state formed out of the Northwest Territory.

Features of the Land. The name of the state is an Indian word meaning *great water,* which was applied to the Ohio River, the southern boundary. In general shape, Ohio is almost a square, although the northern boundary is hollowed out by Lake Erie, and the southern part is irregular, following the river. Michigan also lies on the north, Indiana on the west, Kentucky on the south, West Virginia on the south and east, and Pennsylvania on the east. With an area of 41,222 square miles, Ohio ranks thirty-fifth in size among the states.

A height of land cuts irregularly across the state, so that one fourth of the region drains toward Lake Erie and three fourths toward the Ohio River. To the north of this ridge the land is level, gently sloping to the lake. To the south the land is generally rolling and hilly. Here are the highest points of land in the state, one section reaching 1,500 feet above sea level. Throughout the region the surface is occasionally broken by low hills and narrow bottom lands along the streams.

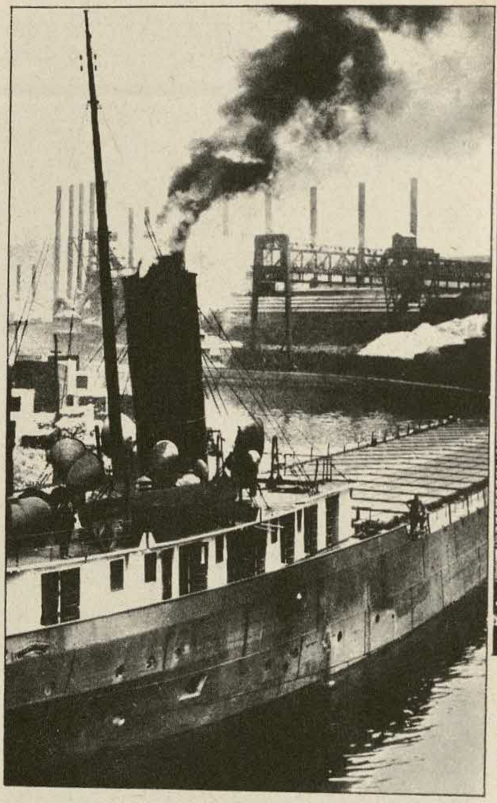
The Ohio River is the most important of all the streams; it alone was one of the main factors in the development of the state. The largest river within Ohio is the Muskingum, which, with its tributaries, drains the eastern part of the state before it flows into the Ohio. Other tributaries of the Ohio are the Great Miami, the Little Miami, and the Scioto. Rivers draining into Lake Erie are the Cuyahoga, the Vermilion, the Maumee, and the Sandusky.

Climate. Ohio lies in the path of many of the storm areas that move across the United States from west to east, with the result that the climate is variable and there are rapid changes from warm to cool weather. The coolest sections of the state are in the north; and although some parts are affected by the moderating influence of Lake Erie, the winters there are cold and the summers are cool. In the south the summer temperatures are high, and the winters are mild. The annual rainfall of about thirty-eight inches is evenly distributed.



A PROSPEROUS COMMONWEALTH
Richly endowed Ohio is an industrial leader.

CAPITAL'S CIVIC CENTER
Columbus has been the capital of Ohio ever since the city was founded, in 1812.



THE NATION'S EIGHTH CITY

Second largest port of the Great Lakes, Cleveland receives iron ore from the west, coal from the east. Ore traffic and steelmaking provide substance for the city beautiful.

The average temperature for the state is about 50° F.

Natural Resources. Ohio ranks high in mineral resources. The greatest underground wealth lies in the bituminous-coal deposits found in the eastern section. Ohio ranks among the leading coal-producing states of the Union. Second in importance are the clay deposits in all parts of the state; they form the basis of a great pottery, brick, and tile industry. In the eastern and northwestern sections there are extensive oil fields, which produce large quantities of natural gas as well as petroleum. Limestone is obtained throughout the state, along with sandstone and other building materials. Other important minerals are iron and salt.

About twenty-three per cent of the state is forested, the principal trees being ash, elm, beech, and maple. There is also valuable hardwood timber. One of the leading forest products is maple sugar.

Agriculture. Ohio has always been one of the leading agricultural states. More than eighty per cent of the land is devoted to farming, for well-watered soil and a favorable climate make possible the production of large and valuable crops. The agriculture is of a general nature. Corn is grown in all parts of the state, chiefly in the fertile soil of the river valleys. Wheat is also raised generally. Other crops are oats, barley, rye, tobacco, and hay. Ohio is one of the leading states in the production of clover seed, potatoes, and sugar beets. Various kinds of fruits, apples being the most important, are raised in all sections.

Livestock raising is also an important branch of the farming industry. Hogs are the most important livestock on the farms, but Ohio is also noted for the number and quality of its sheep.

Manufacturing and Trade. Ohio is also one of the leading manufacturing states. It is ideally situated for manufacturing because of its abundant natural resources and its central location. Of prime importance is the manufacture of iron and steel products.

Ohio is also a leading state in the production of brick, tile, and high-grade pottery. Akron ranks first in the manufacture of tires and tubes; Dayton, in cash registers. Other important industrial products are boots and shoes, paints, varnishes, clothing, meat products, flour, and glass. Printing and publishing, oil refining, and the manufacture of farm machinery and electrical machinery are also leading industries. The chief industrial centers are Cleveland, Cincinnati, Toledo, Dayton, Akron, Columbus, Youngstown, Lima, and Canton.

Ohio has water connections with the Atlantic through Lake Erie and the St. Lawrence Seaway, to all the Great Lakes regions, and to the Mississippi and the Gulf of Mexico through the Ohio River. More than 8,000 miles of railway link the nation's chief markets with all parts of the state. The Ohio Turnpike connects northern Ohio with the Indiana and Pennsylvania turnpikes. Ohio's major cities are served by more than a dozen airlines and nearly 200 commercial airports.

The People and Their Government. Most of Ohio's residents are descendants of the state's eighteenth and nineteenth century pioneers. Only about 5 per cent are foreign born. Ohio has over 9,700,000 inhabitants and is the fifth state in population. Cleveland, Cincinnati, Columbus, Toledo, Dayton, and Youngstown are the largest cities.

Ohio is governed under a constitution adopted in 1851. The governor and other elected state officials serve four-year terms. Some of the state's thirty-three senators serve for four years, the others for two years. The 139-member House serves two years.

Education. Ohio's educational system dates back to the late 1700's, when provisions were made for establishing schools in the Western Reserve. Children from six to eighteen years of age are required to attend school. Ohio University, Miami University, Ohio State University, Bowling Green State University, and Kent State University are all state supported. Other colleges and universities include Western Reserve, Akron, Cincinnati, Youngstown, and Toledo.

History. It is possible that La Salle visited Ohio in 1670. France laid claim to the region, and there followed a long and bitter conflict with England over possession of the area. This dispute was settled by the Treaty of Paris in 1763, when France ceded her claims to Great Britain. Following the Revolution, the Ohio Company, organized by a group of Revolutionary soldiers, purchased large tracts of land from the Federal government under the Ordinance of 1787. The ordinance provided for a representative system of government as soon as the population was sufficiently large.

Settlement was rapid. Marietta, the oldest permanent settlement in the state, was built at the mouth of the Muskingum River in 1788. In 1803, Ohio was admitted to the Union as the seventeenth state. The first capital at Chillicothe was permanently located at Columbus in 1808. Ohio has been the home of seven presidents — Grant, Hayes, Garfield, Benjamin Harrison, McKinley, Taft, and Harding.

For additional information, consult the following articles:

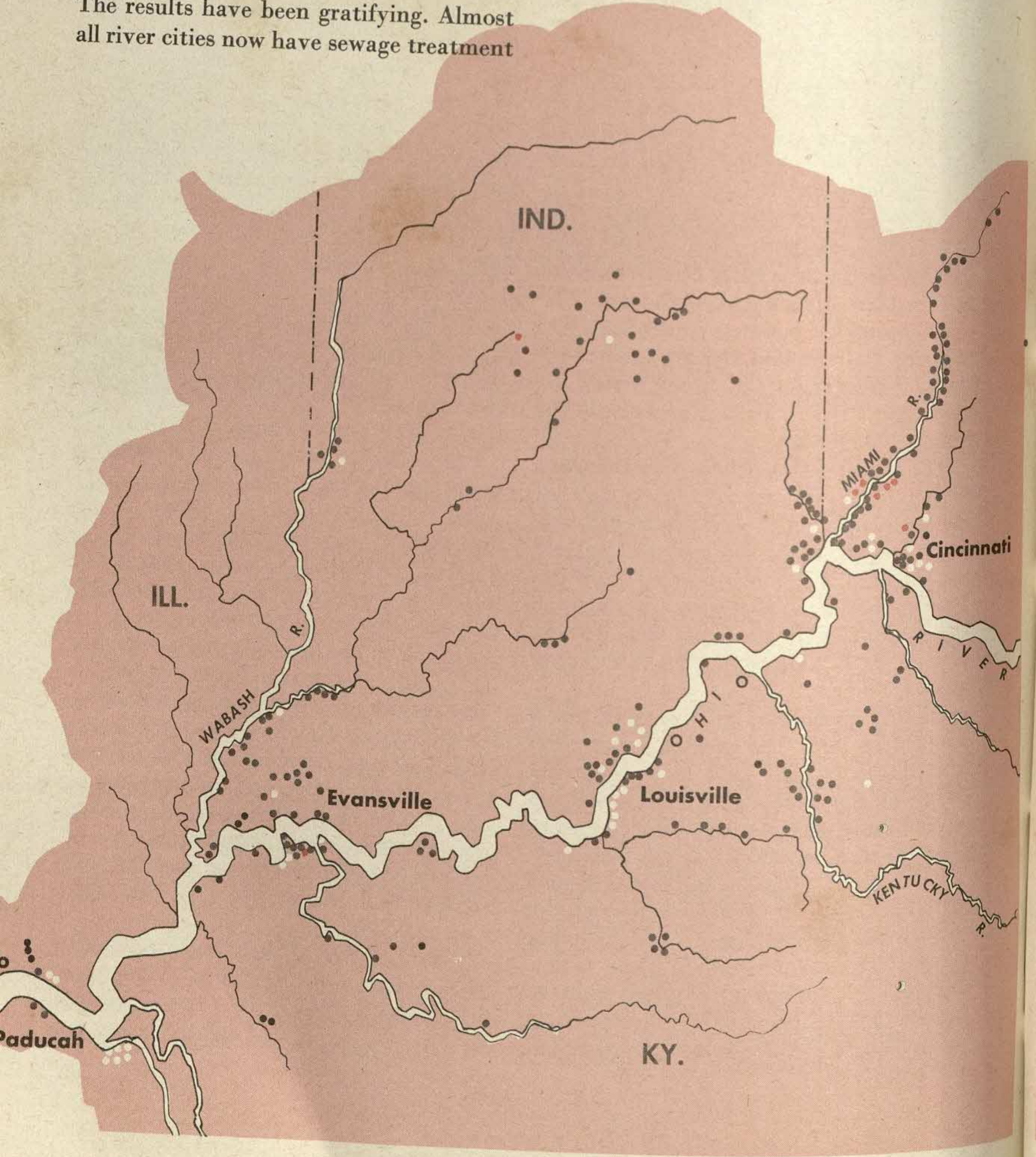
Akron
Cincinnati
Cleveland
Columbus
Dayton
Toledo

OHIO COMPANY. Two companies by this name were organized during the 1700's for the purpose of colonizing the Ohio River Valley. The first company was formed in 1747 by London merchants and Virginians, including two of George Washington's brothers. They were granted nearly 200,000 acres by King George II. Little was accomplished. The second company, organized in 1786 by Revolutionary War veterans, purchased nearly a million acres. The first capital of the Northwest Territory was established at Marietta in 1789. See ORDINANCE OF 1787.

OHIO RIVER. When the first pioneers pushed across the Allegheny Mountains, they found that the broad Ohio River was the best means of transportation to the

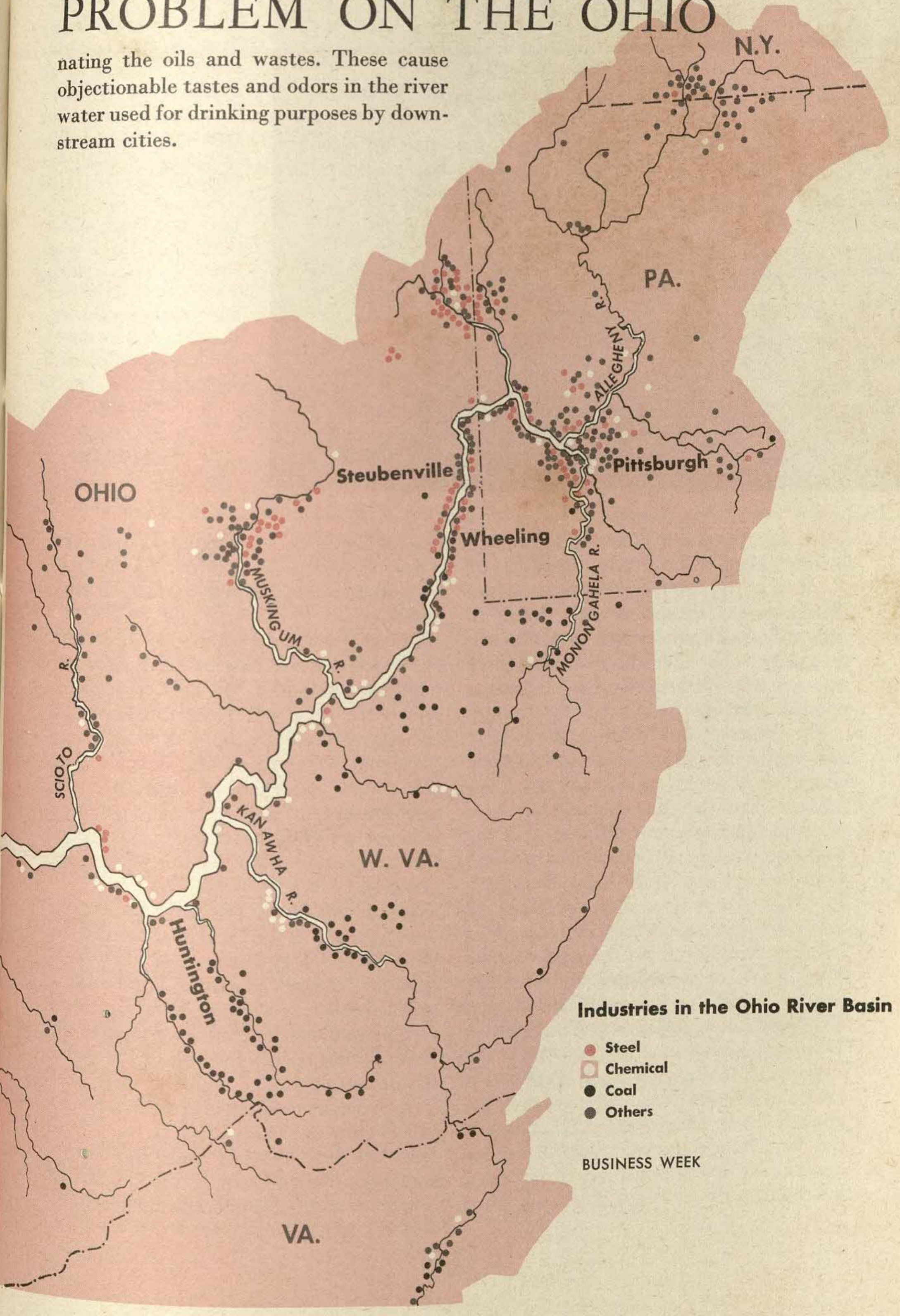
WATER POLLUTION–SERIOUS

Chemical, steel, and coal industries concentrated along the Ohio and its twenty-odd tributaries have turned the broad river into one of America's greatest health hazards. Since 1948, it has been the task of the eight-state Ohio River Valley Water Sanitation Commission (Orsanco) to police these streams and to force industries and communities to treat their wastes. The results have been gratifying. Almost all river cities now have sewage treatment plants in operation. Three fourths of the 1,443 industrial plants affected operate adequate sewage treatment plants or are meeting minimum standards. But much remains to be done, particularly in elimi-



PROBLEM ON THE OHIO

nating the oils and wastes. These cause objectionable tastes and odors in the river water used for drinking purposes by downstream cities.



Industries in the Ohio River Basin

BUSINESS WEEK

WARNING ECHOES FROM THE SHORE

Flatboat families floating down the Ohio in the late 1700's were safest in the middle of the river. They went ashore no oftener than necessary, for Indians lurked in the canebrakes. Often they traveled at night in complete darkness. The men who piloted these boats often used a primitive kind of radar. Striking the side of their boats with an axe, they could judge the distance from shore by the time it required an echo to bounce back from the riverbank.

The Travelers Insurance Co.

West. As the central parts of the country became settled, flatboats plied the waters of the river, carrying farm products to the East or to the Mississippi, and thence to New Orleans. Many thriving towns sprang up along the banks of the river, and there was soon a prosperous steamboat commerce up and down the stream the year around.

The Ohio rises at Pittsburgh at the junction of the Allegheny and Monongahela rivers. In its southwesterly course of 981 miles, it forms the southern boundary lines of Ohio, Indiana, and Illinois, and the northern borders of West Virginia and Kentucky. It enters the Mississippi at Cairo, Ill. The river has a drainage basin of about 204,000 square miles. Chief tributaries entering the Ohio from the right are the Muskingum, Scioto, Miami, and Wabash; from the left, the Kanawha, Big Sandy, Kentucky, Cumberland, and Tennessee. In 1913, and again in 1936 and 1937, the river overflowed its banks and costly floods caused millions of dollars worth of property damage in the Ohio Valley. To overcome this danger and to provide adequate navigation during dry seasons, the Government has built a series of 46 navigation and flood control dams at strategic points on the river. The chief commodities carried on the Ohio are iron, steel, sand, gravel, lumber, oil, coal, and coke.

In recent years, the most serious problem of the Ohio River has been that of water pollution. Hundreds of industrial plants crowd the riverbank from Pittsburgh all the way to the Mississippi. A single large plant may empty many tons of acids, chlorides, water hardeners, or other chemicals into the stream each day. This pollution must be removed by cities further down the river before the water can be used for drinking.

To combat this health hazard, the eight states drained by the Ohio have formed the Ohio River Valley Water Sanitation Commission (Orsanco), which will probably spend more than a billion dollars to eliminate human and industrial waste from the river. More than 80 per cent of the plants have co-operated, and annually spend millions of dollars to install and maintain waste water controls. The record of towns and cities on the Ohio has been even better. More than 90 per cent of the population along the river live in communities with sewage disposal plants in operation or under construction. See FLOOD; TENNESSEE RIVER; WATER PURIFICATION.

OHM, *ome.* In electricity, an ohm is the unit by which resistance to a current is measured. One ohm equals the amount of resistance present when a current of one ampere is produced by a pressure of one volt.

The flow of electricity through a wire is hindered by the resistance of the wire, just as the flow of water through a pipe is hindered by the friction of the pipe. Electrical resistance corresponds to mechanical friction. The greater the resistance, the more pressure, or voltage, must be used in order to force a certain amount of electricity through a circuit.

OIL PALM. Growing densely in the tropical forest of West Africa, the oil palm is the world's great source of palm and palm-kernel oil. Usually the trees reach a height of twenty-five feet; the leaves are often fifteen feet long. The fruit (a drupe) is an orange-colored oily pulp surrounding from one to three seeds. This pulp is the source of an oil which is exported and used in the manufacture of soap and in candle-making. It is also used as a lubricant. The oil from the kernels of the seeds is employed in soaps, perfumes, and chocolate. The oil palm has been introduced into South and Central America, but Africa still furnishes the bulk of the world's palm oil. See PALM.

OILS. Used for a wide variety of purposes, all oils nevertheless have similar characteristics. Whether they come from vegetable, animal, or mineral sources, they are always neutral (neither acid nor alkaline) and are insoluble in water. Nearly all oils will burn when heated in air, giving off a more or less luminous flame. They are usually classified as *fixed* (slow in evaporating) and *volatile* (vaporizing readily).

The fatty, or fixed, oils are further divided into *drying* and *non-drying* oils. A fatty oil which thickens after exposure to the atmosphere and forms a hardened film is a drying oil. Examples are linseed, sunflower, hemp-seed, walnut, sesame, and poppy-seed oils. Non-drying oils include neat's-foot, almond, olive, and castor oils.

The volatile oils are obtained by distilling certain plants with water. Usually they are very acrid and aromatic and dissolve easily in alcohol. Some of them are hydrocarbons; most of them contain oxygen as one of their elements. They usually boil at a temperature considerably above 212° (the boiling point of water). Most of them are used in the manufacture of medicine and perfumes; a few, like oil of turpentine, are important in the mixing of paints and varnishes. Among the important volatile oils are the oils of anise, orange, lemon, lime, mint, cinnamon, clove, thyme, nutmeg, and lavender.

An important characteristic of oils is that, when boiled with caustic potash or soda, a process called *saponification* takes place. Where this occurs, glycerine is set free, leaving a salt of the fatty acid in the form of a soap.

Animal oils are obtained by heating the fatty parts of various animals such as the whale, shark, seal, codfish, and halibut.

Vegetable oils of the fixed type contain certain peculiar ingredients. Olive oil, for instance, contains olein and stearin, while linseed oil is made up chiefly of linolein. Many of these oils, including coconut oil and palm oils, are known as vegetable fats. Such oils usually harden when chilled.

Mineral oils are produced in many grades. The lighter ones, including naphtha and benzine, have a specific gravity of from .70 to .76, are clear, and are extremely volatile. The heavier the oils become, the less their volatility, as in the case of kerosene and gasoline. Still heavier oils are yellow in color and are used for lubrication purposes. Most mineral oils are quite complex in nature and are not easily affected by acids or alkalies.

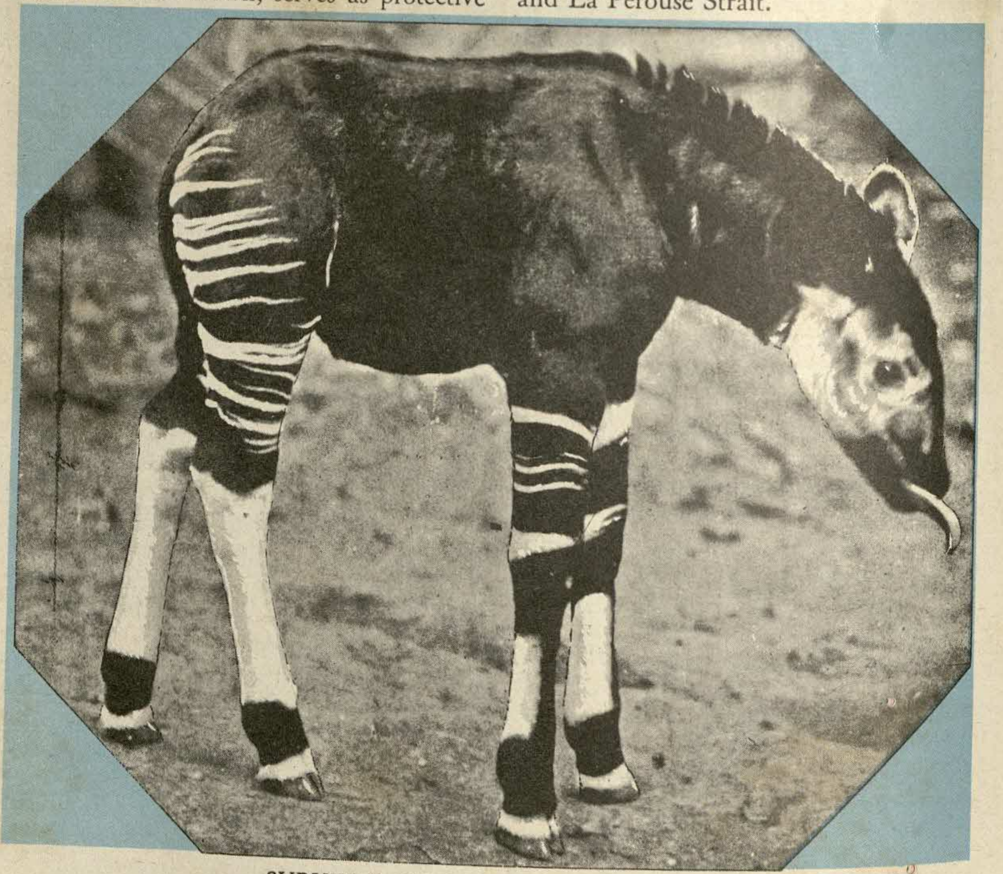
Consult the following titles:

Castor Oil
Coconut
Cod-Liver Oil
Cottonseed Products
Distillation
Paint
Palm Oil
Perfumes
Petroleum
Sperm Oil

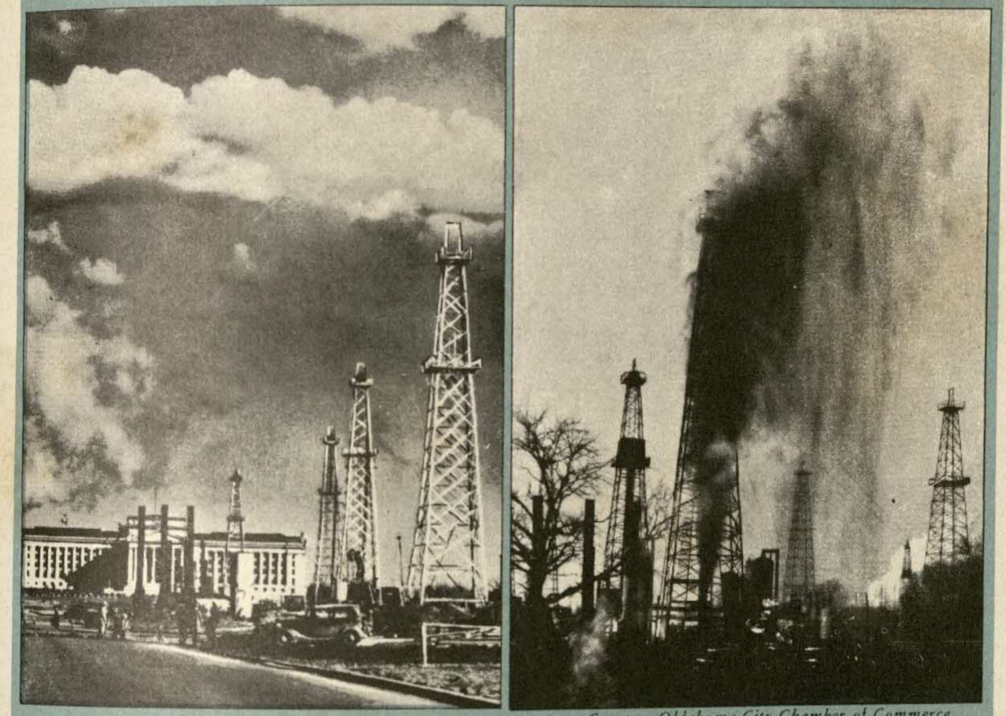
OJIBWA, *o jib′ wa.* Still retaining many of their old habits and customs, the Ojibwa Indians live on great reservations in the Northern United States and in Canada. They are descendants of a once powerful Algonquian tribe that lived in the region of Lake Superior. The Ojibwas are expert fishermen and hunters, lead a very active life, and are tall and well proportioned in body. They have abandoned the elaborate rituals of former days.

OKAPI, *o kah′ pe.* Its sloping hindquarters, short tail, and shape of head show that the okapi belongs to the giraffe family, but it has shorter neck and legs than the giraffe. The animal's coat, which is a deep-purplish color touched with a glint of a warm reddish brown, serves as protective coloring in the dense gloom of the equatorial forests of Central Africa, where it makes its home. The front and sides of its head are a yellow-white and the legs are barred with alternate stripes of black and white. Okapis have large ears, and the males possess short, dagger-like horns. The animals feed on plants.

OKHOTSK, *o′ kotsk,* SEA OF. On the eastern coast of Siberia is the Sea of Okhotsk, an arm of the Pacific nearly enclosed by land. The surrounding lands are the peninsula of Kamchatka, the Kuril Islands, the island of Sakhalin, the Japanese island of Hokkaido, and the Amur province of Siberia. The sea is connected with the Japan Sea by the Gulf of Tartary and La Pérouse Strait.



SURVIVAL OF A PREHISTORIC RACE
The anatomy of the okapi links it with animals of the Mesozoic Era. This relative of the giraffe has a sixteen-inch tongue.



Courtesy Oklahoma City Chamber of Commerce

MID-CONTINENT BONANZA

The rich oil pools which underlie much of Oklahoma reach to the very doors of the State Capitol in Oklahoma City (left). A forest of derricks marks the petroleum-production area. Occasionally an oil well gets out of control and flows wild, like the gusher above.

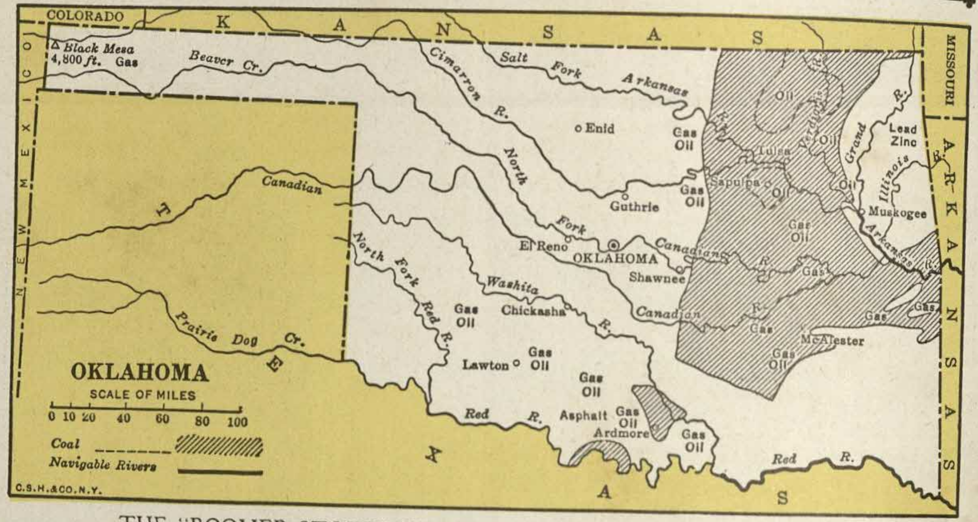
OKLAHO'MA. If one were able to peer beneath the surface of the undulating prairies of Oklahoma, one would see great pools of the dark, sticky substance which keeps airplanes and automobiles running. Oklahoma has so much oil that it furnishes a large part of all that is used in the United States. In addition to oil, there are rich deposits of other minerals, as well as great stretches of productive farm land.

For many years Oklahoma was set apart, reserved for Indians only, dividing the hordes of westward-moving pioneers into two streams that passed around its borders. Finally, when it was opened to white settlement, the state seemed to grow up overnight, for farmers came in by the thousands, seeking its rich agricultural land. So quickly did it develop that it was given the popular name of "Boomer State." It has also been called "Sooner State," because many white settlers entered the state before the official opening, in order to be on hand to claim choice lands.

Features of the Land. Oklahoma is almost equidistant from the Atlantic and Pacific oceans. Colorado and Kansas lie to the north, Missouri and Arkansas to the east, Texas to the south, and Texas and New Mexico to the west. The state has a total area of 69,919 square miles, ranking eighteenth among the states.

The eastern half of the state is rolling and some parts are mountainous. The elevations of the area range from 1,000 to 2,500 feet above sea level, and the mountain slopes and valleys are well forested. The western part of the state consists of rolling prairies which gradually slope upward to high, level plains. The elevation in the northwestern corner, called the Panhandle, reaches an elevation of 4,800 feet.

Oklahoma is drained chiefly by the Arkansas and the Red rivers, two great



THE "BOOMER STATE" HAS GAS AND COAL AS WELL AS OIL

Oklahoma derives much of her great wealth rom coal, natural gas, lead, and zinc.

tributaries of the Mississippi. The Red River and the Washita drain the southern part; the Arkansas, with its tributaries the Cimarron, Salt Fork, and Canadian, drains the eastern and central regions.

Climate. Oklahoma has a moderate climate, although it varies with the altitude both in temperature and humidity. Winters are mild, but the summers are often very hot. The rainfall varies throughout the state, ranging from twenty inches in the west to forty-five inches in the east. The rains are not always well distributed, the latter part of the summer often being dry, particularly in the west.

Natural Resources. In addition to its oil fields, which have produced more than 155,000,000 barrels of oil a year, Oklahoma has extensive deposits of coal. Oklahoma ranks high in the production of natural gas, lead, and zinc. Other minerals are asphalt, clay, sand, gypsum, marble, limestone, and manganese.

Many of the Oklahoma forests have been depleted, but enough remain to form the basis of a thriving lumber industry. The forests are in the eastern half of the state and include yellow pine, red gum, hickory, and oak.

Farming in Oklahoma. Although Oklahoma is rich in mineral resources, farming was not only the basic industry of the first settlers, but is today the leading industry of the state. About two thirds of the land area is devoted to agriculture, and a large part of the population is dependent upon farming. The types of farming vary greatly in different parts of the state, owing to the differences in altitude, climate, rainfall, and soil. The most valuable crops are cotton, wheat, corn, oats, hay, rye, and potatoes. Other farm products include tobacco, grain sorghums, grapes, apples, and pears. Dairying and the raising of livestock are important divisions of agriculture.

Manufactures. The principal manufacturing industries are those connected with the state's mineral resources, including the refining of petroleum, the smelting of lead, the manufacture of portland cement and gypsum products, and the making of glass and clay products. Other leading industries include flour and grist milling, meat packing, the manufacture of lumber products, cotton ginning, and printing and publishing.

Trade and Transportation. None of Oklahoma's rivers is navigable; thus the internal commerce is carried on by motor trucks and railroads. The total railroad mileage is about 6,000. An excellent highway system furnishes more than 9,000 miles of highways in the state, many of them surfaced.

The People and Their Government. Before Oklahoma was opened to white settlement, it was an Indian reservation. After it was admitted to the Union, certain portions of the land were set aside for the Indians, and today there are more Indians in Oklahoma than in any other state. There are also about 170,000 Negroes. The population of Oklahoma is about 2,324,000. The largest cities are Oklahoma City (the capital), Tulsa, Muskogee, Enid, Shawnee, and Lawton.

All state officers, including the governor, are elected for four-year terms. The judicial system is headed by a supreme court of nine justices who serve six-year terms. There are 118 members in the lower house of the legislature and forty-four in the senate. Senators serve four years and representatives two years. Oklahoma has a unique constitution in that its original clauses contain laws that are usually adopted by legislatures. The reason is that Oklahoma was one of the last states admitted to the Union, and so was able to base its constitution upon the best parts of the laws of the older states.

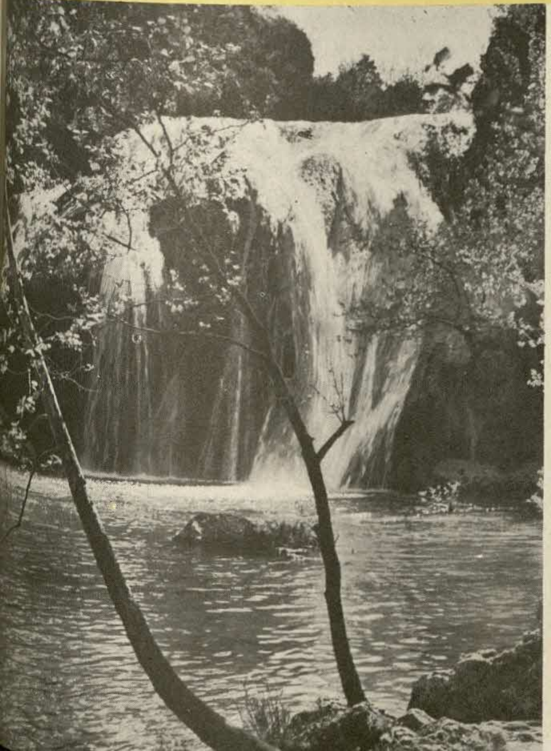
Education. Oklahoma has a progressive school system administered by a superintendent of public instruction and a state board of education. At the head of the system is the University of Oklahoma, at Norman. In addition to the elementary and secondary schools, there are six normal schools. Separate schools are maintained for Negroes. Other institutions of higher learning include Phillips University, University of Tulsa, Oklahoma Agricultural and Mechanical College, and the Negro Agricultural and Normal University.

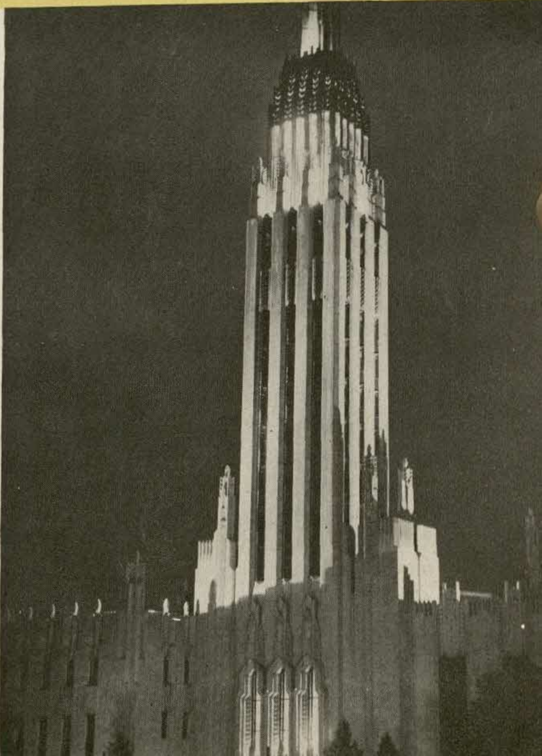
History. Oklahoma was long the home of Indians who were members of the Five Civilized Tribes: the Cherokees, Chickasaws, Choctaws, Creeks, and Seminoles. They made the territory their home after they were forced out of the eastern part of the country by the slowly advancing white men. Gradually they acquired increased

"THE LAND WE BELONG TO IS GRAND"

In Oklahoma man has taken oil from under the land, but left the natural beauty of places like Turner Falls, (left). The Boston Ave. Methodist Church in Tulsa has one of the most modern church buildings in the country.

A.Y. Owen





holdings of land in Oklahoma, which was set aside in 1834 as Indian Territory. Later they were asked to share their land with other Indians who had lost their original land. These additional tribes included the Sacs, Foxes, Kansas, Pottawatomies, Shawnees, Wichitas, and Osages. The Indians agreed to remain within their territory, where they could have their own government and practice their own customs.

White settlers had long wanted to have a share of the rich Oklahoma lands, and at last their demands became so insistent that the United States government purchased from the Indians a portion of their land. The new lands were opened to white settlement at noon, April 22, 1889. When the signal was given, thousands of settlers who had gathered all along the border swarmed over the line to file claims in one of the biggest "land grabs" in history. This episode is dramatically described by Edna Ferber in her book *Cimarron*.

Farms were staked out and cities rose overnight. In 1890 the country was organized as the Territory of Oklahoma. In 1906 Congress passed an act authorizing the union of Indian Territory and Oklahoma Territory and their admission to the Union as a single state. In this year the tribal organization of the Indians was broken up, and the land which was formerly owned by the tribes was divided among the individual Indians. In 1907 a state constitution was drawn up and the state was admitted to the Union. Since the time of its founding as a territory, Oklahoma has been a prosperous state, its greatest development coming, however, after the discovery of oil. See Oklahoma City.

OKLAHOMA CITY, Okla. Situated on the North Canadian River, in the heart of a rich agricultural and mineral district, Oklahoma City is the capital and largest city of the state. It is an important manufacturing and railroad center, where thousands are employed in the preparation and shipping of the wheat, corn, cotton, alfalfa, fruits, and cattle that are raised on the surrounding farms. Meat-packing plants and slaughter houses are the principal industrial establishments. Other important enterprises are flour mills, oil refineries, foundries, grain elevators, cotton gins, and brick factories. A large revenue is derived from the near-by oil fields, and many oil companies have their headquarters in the city.

The citizens of Oklahoma City are very proud of its beautiful boulevard system, its numerous parks and its many imposing modern buildings. The outstanding structures are the four-million-dollar Oklahoma State Capitol and the Federal building. There is a large library, the Oklahoma City University, and the state medical school. The University of Oklahoma and the Central State Teachers' College are within a few miles of the city. There are also numerous hospitals and churches. The city is fortunate in having nearby almost unlimited supplies of natural gas suitable for heating, as well as an abundant water supply from Lake Overholzer. The city has a city-manager plan of government. It has a population of about 321,000.

O'KRA. Grown for its edible pods, okra is widely cultivated in the southern part of the United States. The pods are used either as a vegetable, or as a thickener for soups and stews because of a gluelike substance which they give out when cooked. The plant grows in all subtropical climates.

OLD-AGE PENSIONS. It is now generally believed that people who are too old to work and have no savings to live on become a burden to the community in which they live and require assistance by law. Such assistance takes the form of old-age pensions.

The Social Security Program is the medium for providing such pensions in the United States. A revised old-age pension program for Canada was established in 1951 with the passage by the Canadian Parliament of the Old Age Security Act and the Old Age Assistance Act. The Social Security Program was first adopted in the United States in 1935.

In the United States, retirement benefits are paid to workers who stop working at age sixty-five or later. The allowances are paid monthly and are based on average monthly earnings over a period of years. The funds needed for the operation of the plan are obtained by fixed contributions from both employers and employees.

The Canadian Security Act provides that pension payments shall be made to persons who reach the age of seventy and who have lived in Canada for 20 years. No test of need is made or proof of earnings required. The Assistance Act allows the Canadian federal government to share with the provinces the cost of a monthly pension to needy persons between 65 and 69.

Canada has found that old-age pensions are much more expensive than was first expected. Enough has not come from taxes to finance the project and borrowing has been necessary. Despite this problem, there has been a strong move in Canada to increase pension payments.

The U.S. Social Security Program is handled by the Department of Health, Education, and Welfare. It is constantly at work to improve its payment plan.

Amendments to the Social Security Act adopted in 1956 make women eligible for benefits at sixty-two years of age. Widows may receive full benefits at sixty-two. Working women can receive these benefits at sixty-five. See PENSION.

OLEOMARGARINE. The original margarine, with which Mege-Mouriez, a French chemist, in 1870 won the prize Napoleon III had offered for a butter substitute, was composed largely of beef oleo. Beef oleo and other fats are still used in making margarine. Whale oil is much used in Europe. In North America, however, cottonseed oil, soybean oil, corn oil, and other vegetable oils are used almost exclusively. They are mixed with skim milk, water, salt, a coloring substance, an emulsifier, and a preservative. Usually 15,000 International units of vitamin A are added to each pound of margarine. When this is done, margarine is equal to butter in food value.

The United States government taxed colored margarine at the rate of 10 cents a pound before 1950. The tax on uncolored margarine was only ¼ cent a pound. Most margarine was therefore bleached before sale. The tax on colored margarine was abolished in 1950. Only Wisconsin and Michigan now place restrictions on the sale of colored margarine. Margarine costs less than half as much as butter. About as much margarine as butter is eaten.

OLIGARCHY. See GOVERNMENT.

OLIVE. The olive tree, now grown in nearly all warm regions of the world, is believed to be a native of Asia Minor, where it still thrives in the warm, dry areas along the Mediterranean. The fruit was first introduced into California by the Franciscan monks about the time of the American Revolution. From that small San Diego Mission olive grove, California has developed into one of the world's greatest producers of fine olives.

The fruit of the olive tree is a drupe, somewhat resembling a plum. The trees usually reach a height of about twenty-five feet. They require a mild temperature, light, well-drained soil, and not too much moisture in the air. In their propagation, cuttings are placed in the warm, sandy earth, are later transferred to the nursery, and finally to the orchard. The tree, though slow-growing, bears fruit for centuries. The leaves are dusky green in color, the wood a peculiar yellowish color streaked with dark lines.

Olive wood takes a high polish and is much used for small decorative articles and boxes. The leaves from the olive tree in ancient days were made into wreaths to crown the conquering Greek and Roman soldiers. Today the olive branch, borne in the beak of the dove, symbolizes peace.

Both green and ripe olives are eaten, the latter being of a black or brownish color. For table use, they are usually pickled in brine and served as a relish. Some varieties are stuffed with pimento, thus acquiring a distinctive flavor. Although nutritious, olives are lacking in vitamins. From the pulp, olive oil of varying grades is obtained. See OLIVE OIL.

OLIVE OIL. Used for a multitude of purposes, olive oil, obtained by pressing the pulp of ripened olives, has the same food value as the olive from which it comes. The finest oil, called *virgin,* comes from the "cream of the crop." In the manufacture of the oil, the olives are peeled, the kernels are removed, and the pulp is subjected to slight pressure. Ordinary grades are processed by running olives through rollers and later pressing the broken pulp in giant presses. The oil drains into a tank of water, the impurities sinking to the bottom, the pure oil remaining on top. It is later filtered and clarified. Further pressings of the pulp produce low-grade oils used in textile manufacture and in dyeing.

Olive oil is used as hair tonic, as a skin conditioner, as cooking fat, and for medical purposes. It is also mixed with peanut or cotton seed oil to produce cheaper grades of salad oil. It is a popular ingredient of good soaps.

OLIVES, Mount of, **or MOUNT OLIVET.** Located just east of Jerusalem beyond the Kedron Valley and rising 200 feet above the city, the Mount of Olives was the site of many of the memorable events in the life of Jesus Christ. On its western side was the Garden of Gethsemane, where Jesus often went to pray. From this mountain He made His triumphant entry into Jerusalem, and He preached one of His sermons there. It is stated in *Acts* that Christ ascended into Heaven from the Mount of Olives.

OLYMPIA, *o lim' pi a.* Every four years, in the days of ancient Greece, the athletes of the city states gathered on the plain of Olympia in Elis for the Olympic Games. Here, the Greeks built statues, temples, tombs, and altars, and brought treasures and offerings to their gods. One of the temples was dedicated to Zeus (Jupiter) and contained the famed statue of the deity by Phidias. Another was in honor of Hera. Other structures were erected to house the treasures and to fete the Olympic victors. The well-known statue by Praxiteles, called *Hermes,* was found here.

OLYMPIA, Wash. Lying in a fertile valley that projects as a peninsula into Puget Sound, and with surrounding forest-covered mountains that serve as a background for the towers and spires of its buildings, Olympia, capital of the state of Washington, is noted for its picturesque setting. Considerable manufacturing is carried on, water power being furnished by the fast-flowing Des Chutes River, which enters the sound near the site of the city. Olympia has a number of outstanding buildings, which include the capitol and other state buildings, a Federal building, the county courthouse, and the Temple of Justice. Olympia was incorporated as a town in 1859, long before Washington became a state. It has a population of over 15,500.

OLYMPIAD, *o lim' pi ad.* So important were the Olympic Games in the lives of the Greeks that they dated their events from the time of the first competition in 776 B. C. The four-year period between successive games was called the Olympiad, and it was used as a basis for determining dates.

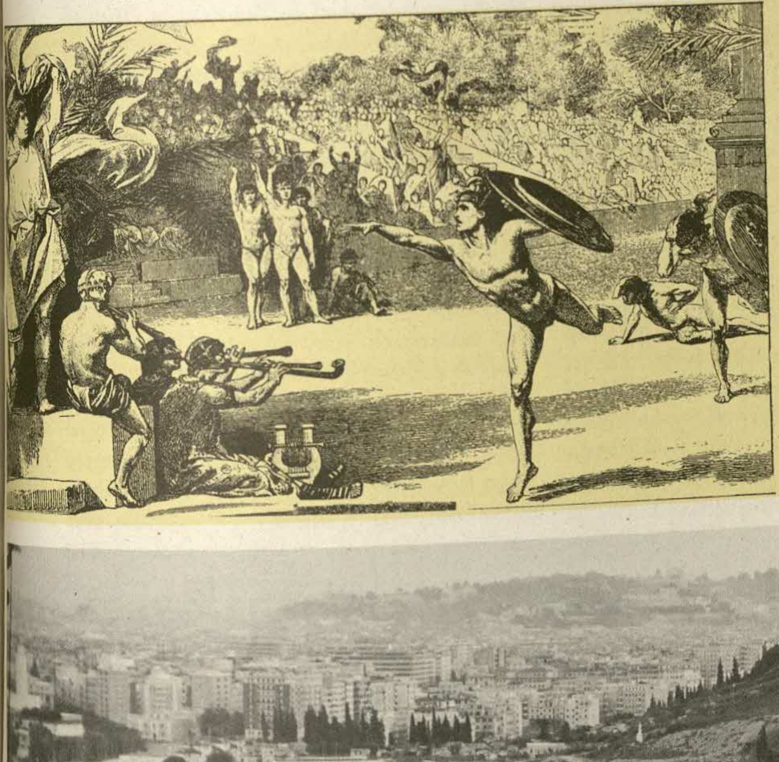
OLYM'PIC GAMES. No greater honor can befall an athlete than a victory in the Olympic Games. Largest and most famed of all athletic competitions, the Olympic Games of the modern era follow in the tradition of the ancient Olympics, which were the most cherished athletic festivals among the Greeks.

The Olympics are held every four years in a city designated by an international committee which governs the competitions. Every nation may enter competitors in the various sports, which range from horseback riding to ski jumping, and include track and field events, a marathon run, swimming, ice skating, fencing, cycling, boxing, wrestling, gymnastics, ice hockey, water polo, association football, basket ball, weight lifting, bobsledding, and a number of other sports. The winners of each event are honored as champions, but no team awards are officially given.

The first recorded Olympic Games were held in 776 B. C., and took place every four

Wide World

UPI



OLYMPIC SIGHTS AND SITE

Vera Krepkina, Russian broad jumper, top left, exhibits excellent form as she sets an Olympic record in the women's broad jump event. Rafer Johnson, above, of the United States, hurls discus as part of the decathlon event. Athletes, left, compete in foot race during ancient Olympic games. Rome's modern Olympic Stadium, below, on the outskirts of the city, was designed for Olympic events.

Wide World

years thereafter until A. D. 394, when the Roman emperor, Theodosius, stopped them. They were held at Olympia, and at first drew contestants only from the Peloponnesian Peninsula. Gradually, however, the other Greek city states sent contestants, and for many years the games were representative of all Greece. They were dedicated to Zeus, and constituted a religious festival to which each city state brought its most valued treasures as offerings. The victors in the contests, which included running races, wrestling, discus throwing, and the marathon (in honor of the famous run by Pheidippides after the Battle of Marathon) were crowned with garlands of wild olive.

From 394 until 1896, the Olympics were not held. In the latter year, however, they were revived in Athens, and the winter Olympics, held in February before the summer competitions, were added later. The games are dedicated to peace and good will among nations. At the Olympics held in Saint Louis in 1904, very few contestants from other nations were entered. As a result, a special meet was held in Athens in 1906. No competitions were held in 1916, 1940, or 1944, during the two World Wars.

Cities at which the Olympic games have been held are: Athens, 1896; Paris, 1900; Saint Louis, 1904; Athens, 1906 (special); London, 1908; Stockholm, 1912; Antwerp, 1920; Paris, 1924; Amsterdam, 1928; Los Angeles, 1932; Berlin, 1936; London, 1948; Helsinki, Finland, 1952; Melbourne, Australia, 1956; and Rome, Italy, 1960.

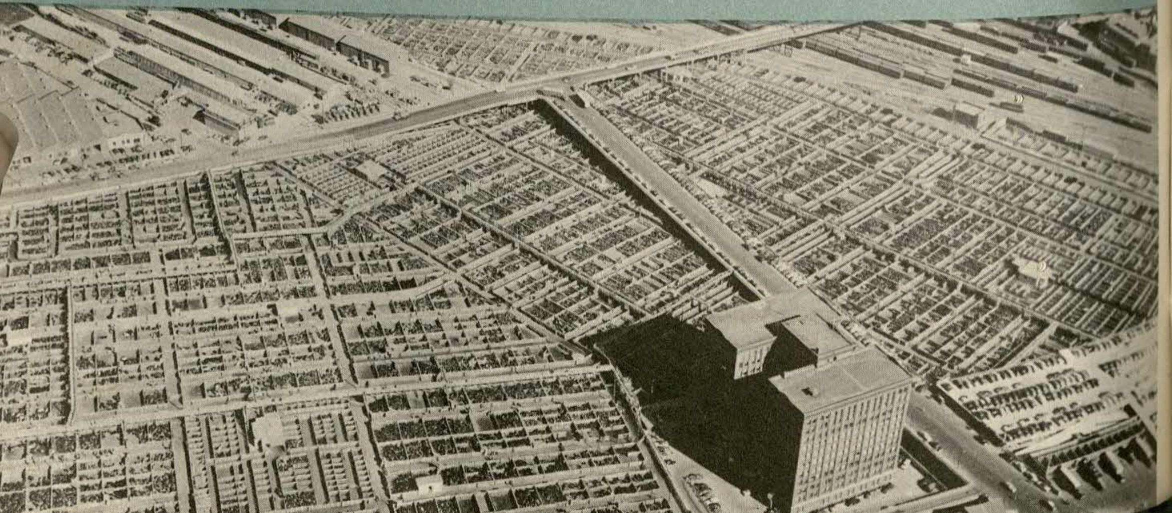
OLYMPUS. Zeus and Athena, Hermes and Aphrodite, Artemis and Hera, all dwelt on Mount Olympus, the home of the gods, according to Greek mythology. This mountain, located between Thessaly and Macedonia, is more than 9,500 feet high. There were many other mountains which were also called Olympus by the Greeks, both in Greece and in Asia Minor.

OMAHA, NEB. Situated on the banks of the Missouri River, on the extreme eastern border of Nebraska, is the city of Omaha, a thriving industrial and manufacturing center, the largest in the state. It lies in the heart of a vast agricultural region for which it serves as chief market and distribution point. Ten great railroads have terminals here, built to handle the great quantities of grain and livestock that are brought to Omaha for transshipment. Omaha's greatest industry is meat packing, followed by the manufacture of dairy products, flour, smelter products, and railroad equipment.

Omaha is a modern and beautiful city, with wide streets and high office buildings. The people of the city are particularly proud of their parks, numbering more than forty-five, their Community Playhouse, and

KING-SIZED MEAT MARKET

Omaha, the largest city in Nebraska, is in the heart of a large agricultural area and is a great meat packing center. Its stockyards are rapidly becoming the world's largest.



their Symphony Orchestra, which ranks high among orchestras of the nation.

Omaha has a well-organized education system which includes more than sixty schools. Among the more famous higher institutions of learning are Creighton University, the University of Omaha, and the medical school of the University of Nebraska. Other outstanding buildings and institutions are the Joslyn Memorial Fine Arts Building, the Federal building, the Medical Arts Building, and numerous churches and hospitals.

Lewis and Clark visited the site of Omaha in 1804. The first settlement, an Indian trading post, was established in 1825. It was followed by several other small settlements. Omaha itself was laid out in 1854, and was incorporated as a city in 1857. The city gradually grew larger as it absorbed the numerous surrounding towns. The first railroad reached Omaha in 1863, and its development as a meat-packing center began immediately. For a number of years it was the seat of the government of the territory and state of Nebraska, but the capital was later moved to Lincoln. Omaha has a population of about 304,000.

OMAR KHAYYAM, *ki yahm'*. Loved by readers throughout the world is the famed *Rubaiyat*, a book of verse written by Omar Khayyam, a Persian poet, and translated by Edward Fitzgerald. Omar Khayyam was more than just a poet. He was an astronomer and philosopher and wrote a number of scientific works. Born in Nishapur, he is said to have lived in the latter part of the eleventh century.

A familiar passage from the *Rubaiyat* is:

The Moving Finger writes; and having writ,
Moves on; nor all your Piety nor Wit
  Shall lure it back to cancel half a Line,
Nor all your Tears wash out a Word of it.

ONEIDA, *o ni' dah*. Only one Iroquois tribe sided with the Americans in the Revolutionary War. This tribe was the Oneida, a powerful band of Indians living on Lake Oneida, N. Y. They were attacked and driven from their homes by the English and the other Iroquois Indians. After the war most of the tribe returned to Oneida, but some of them settled along the Thames River in Ontario. About a hundred years ago the American Oneidas went to a reservation in Northern Wisconsin, where about 3,350 of them now live.

O'NEILL, Eugene Gladstone (1888-1953). One of the most noted playwrights of the twentieth century, Eugene O'Neill has exposed in his dramas the mental traits of his characters, and his plots show the effect of those mental traits on the lives involved. In one of his leading plays, *Strange Interlude,* O'Neill introduced the unusual technique of having his actors speak their hidden thoughts, aside, before continuing their conversation. Some of his dramas are unusually long, *Strange Interlude* occupying about five hours on the stage.

O'Neill was born in New York City, attended Princeton and Harvard, and spent some time at sea, on the vaudeville stage, and as a New York newspaper reporter, before he began, at twenty-six, to write dramas. Some of his first shorter plays were produced by the Provincetown Players. In 1920 he received the Pulitzer Prize for *Beyond the Horizon;* in 1922, for *Anna Christie;* and in 1928, for *Strange Interlude.* Others of his plays are *Emperor Jones, The Hairy Ape, Desire Under the Elms, The Great God Brown, Mourning Becomes Electra, Ah! Wilderness, Days Without End,* and *Long Day's Journey Into Night.*

ONION, *un' yun*. A member of the lily family that has been in cultivation for thousands of years, the onion is now one of the world's most important vegetables. It is usually considered a biennial, although some varieties are perennials. Onions thrive best on muck soils and in a cool climate.

The onion plant has long, hollow leaves and an underground bulb, which is the edible part. The flavor varies with the size of the bulb, and often the same species of onion will have distinctly varying flavors in different localities. There are more than twenty varieties, the best known of which are the Spanish, Bermuda, Portuguese, and Strassburg. The plant is believed to have

TOPPING PARLIAMENT HILL
The Peace Tower, Houses of Parliament, Ottawa.

originated in Egypt. In Spain, the onion forms one of the principal table foods. Though onions have very little food value, they are a good source of Vitamin C. They may be eaten cooked or raw, and are used as flavoring, or in the making of various types of pickles.

ONONDAGA, *on on daw' ga.* Keepers of the council fire in the days of the Five Nations, the Onondaga Indians were a peaceful Iroquoian tribe living on Lake Onondaga. Only a handful of Onondagas have survived, about 750 living on the reservation in New York, while others reside on the Grand River Reservation in Canada.

ONTA'RIO. The most populous province of Canada, Ontario is, next to Quebec, the largest of the organized provinces. Although it is an inland province, it is nearly surrounded by water. A large part of its northern and eastern boundary is formed by Hudson Bay and James Bay, and a series of small lakes and the Ottawa River form a large part of the rest of the eastern boundary; while its entire southern line is marked by the Saint Lawrence River, four of the Great Lakes, and small rivers and lakes from Lake Superior to the Lake of the Woods. On the west, Ontario is bounded by Manitoba, and Quebec lies beyond its eastern border. The total area of the province is 412,582 square miles.

Features of the Land. Ontario for the most part is composed of level or rolling land broken occasionally by low hills. The more irregular sections of the province are found in the southeastern part, where a ridge of land extends northward from the extreme eastern end of Lake Ontario to a point just north of Lake Huron. Running nearly parallel to this is another height of land known as the Niagara escarpment, extending from Niagara Falls northwest to the tip of the Bruce Peninsula, which separates Georgian Bay and Lake Huron. Stretching away from these elevated sections to the north is the great Laurentian Plateau.

The most important streams of the province are those that form the boundary lines. Others are the Maganatawan, Muskoka, Thames, and Petawana, all of which flow southward. The Severn, Albany, and Abitibbi rivers flow into Hudson Bay. There are innumerable lakes in Ontario, among which are Nipissing, Nipigon, Simcoe, and Muskoka lakes, and Lake of the Woods.

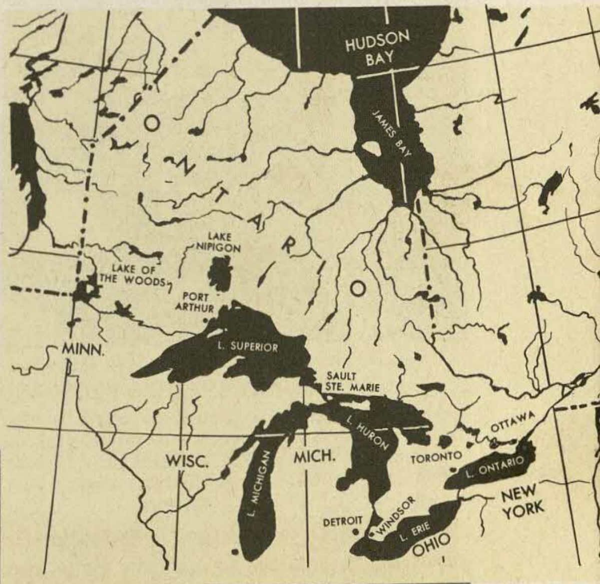
Climate. The southern part of Ontario has a typical continental climate with moderately cold winters and fairly cool summers. This section is affected by the Great Lakes, which tend to prevent sudden or extreme changes of weather. In the north, however, there are great extremes of temperature, the summers being hot and the winters very severe. The average yearly rainfall is about thirty-two inches.

Natural Resources. The principal mineral deposits of Ontario are found in the Laurentian Plateau, lying almost in a line stretching southward from Hudson Bay. The most famous part of this region is the Sudbury section, where are found the richest nickel deposits in the world. In the Cobalt region north of Toronto are some of the most valuable silver and cobalt deposits. There are also valuable deposits of gold. Petroleum and salt are found along the shores of Lake Huron.

The Great Lakes and inland waters of Ontario yield a plentiful supply of important commercial fish. Large timber areas keep sawmills and paper plants operating.

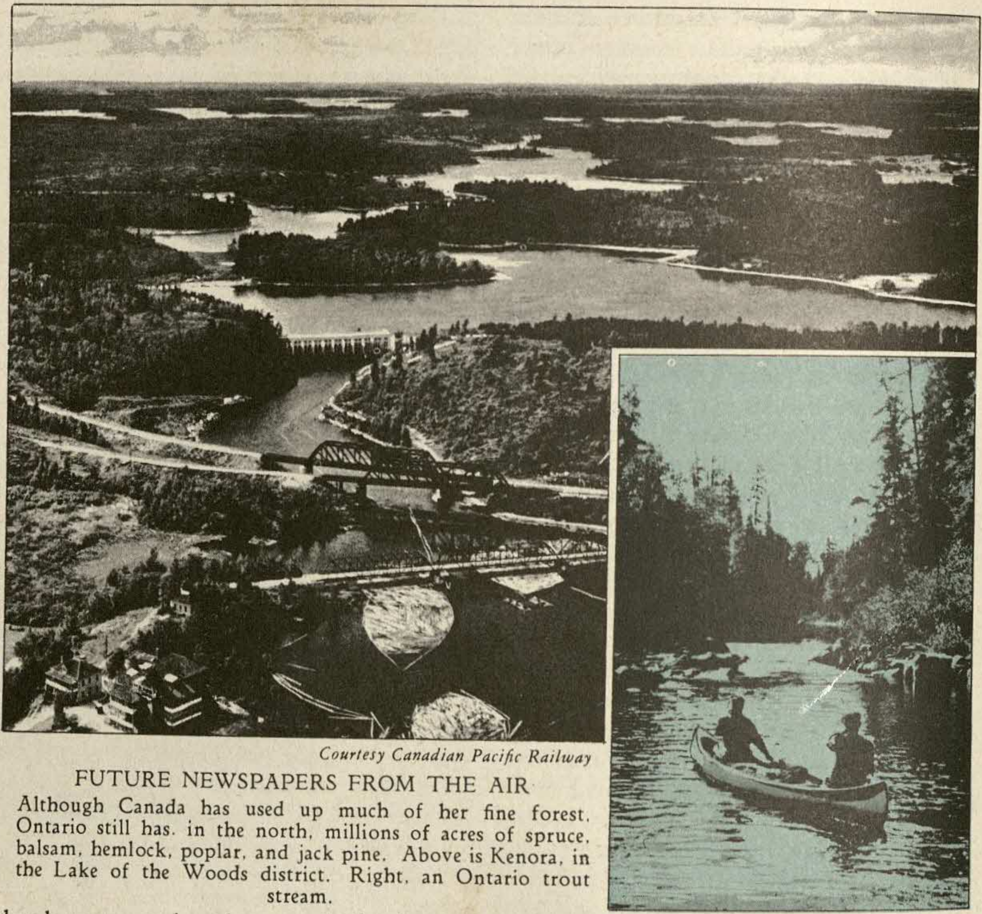
Farming in Ontario. The agricultural products of Ontario are those typical of a temperate climate: hay, oats, wheat, barley, rye, flax, peas, buckwheat, potatoes, sugar beets, tobacco, and a large variety of vegetables. The mild climate along Lake Ontario and Lake Erie makes profitable the growing of fruit, particularly apples, peaches, cherries, and grapes. Extensive pasture lands support large numbers of high-grade cattle, sheep, and horses. Dairying is a leading source of revenue.

Manufacturing Industries. Manufacturing in Ontario has reached a high state of development because of rich natural resources, unlimited water power, and excellent transportation facilities. Lumber products lead the list of manufactured goods, followed by iron and steel, flour, machinery, furniture, paper, cotton goods, and woolens. There is a vast water-power



HEART OF THE DOMINION'S GOVERNMENT

The group of Gothic buildings on the bluffs above the Ottawa River make a fine architectural display. Houses of Parliament and departmental buildings dominate Ottawa and may be seen from a distance before any other part of the city is visible.



Courtesy Canadian Pacific Railway

FUTURE NEWSPAPERS FROM THE AIR

Although Canada has used up much of her fine forest, Ontario still has, in the north, millions of acres of spruce, balsam, hemlock, poplar, and jack pine. Above is Kenora, in the Lake of the Woods district. Right, an Ontario trout stream.

development, the largest hydroelectric plant being located at Niagara Falls and owned and operated by the province of Ontario.

Trade and Transportation. The waterways of the province furnish the greatest means of transportation and trade. There are a number of commercial centers located on the Great Lakes and the several rivers, among which are Ottawa, the Dominion capital, Toronto, the provincial capital, Hamilton, Niagara Falls, Windsor, Owen Sound, Sault Sainte Marie, Port Arthur, and Fort William. Canada's two greatest railroads—the Canadian Pacific and Canadian National—cross the province, giving it more than 10,000 miles of railway.

Government and Education. The Governor-General of Canada appoints a lieutenant-governor to head the executive branch of Ontario's government. The latter serves for five years and is assisted by a council made up of eleven department heads who are also members of the legislature. Ontario has a one-house legislature, composed of ninety representatives who are elected by popular vote. The judicial system is headed by a supreme court.

The minister of education has charge of Ontario's progressive school system. Toronto University heads the system, which includes elementary and secondary schools and a number of normal, technical, and professional schools. School attendance is compulsory for children from eight to sixteen years. Under specified conditions, separate Catholic schools may be maintained. Among the private universities are

Queen's University (Kingston), University of Ottawa (Ottawa), Western University (London), and McMaster University (Hamilton).

History. Ontario became a possession of Great Britain in 1763, and was made a part of Quebec province in 1774. In 1791 the province was divided into Upper Canada, west of the Ottawa River, and Lower Canada, east of the river, each having an independent legislature. A rebellion of discontented radicals broke out in 1837 in both Upper and Lower Canada, but after some trouble it was finally suppressed. The result was that in 1841 these two divisions were again joined together under one parliament for purposes of more effective government. When the Dominion of Canada was organized, in 1867, Ontario was made a separate province.

With the development of its resources and a great influx of European people, Ontario has had a steady development. The largest part of the population is composed of English, Scottish, and Irish, although there is a considerable foreign-born element. Ontario has a population of about 5,952,000. See OTTAWA; TORONTO.

ONTARIO, LAKE. Easternmost and smallest of the Great Lakes, Lake Ontario is part of the natural boundary between the province of Ontario and Northwestern New York. It is 326 feet below Lake Erie, the waters from which come tumbling into it over Niagara Falls. Lake Ontario is oval in shape, and stretches in an east-west direction for 193 miles. At its eastern end it empties into the Saint Lawrence River. Its ragged coast line is dotted with numerous inlets and fine harbors, from which westbound traffic departs for the trip through the Welland Canal into Lake Erie.

Lake Ontario is also connected by canal with the Hudson and Ottawa rivers, and by a system of canals with Georgian Bay and Lake Huron. Oswego, Hamilton, Kingston, and Toronto are its leading harbors; the Trent, Oswego, Genesee, and Black rivers, its most important tributaries. See GREAT LAKES, THE.

ONYX, *on' iks.* The variety of chalcedony called onyx consists of parallel layers of quartz in alternating colors, such as white and black or white and red. The fact that the layers are in even planes makes onyx desirable for cameos, in which the figure is carved in one color and contrasts with the background of a distinctly different color (see CAMEO). Cameos cut from shells having varicolored layers are more easily made and more common.

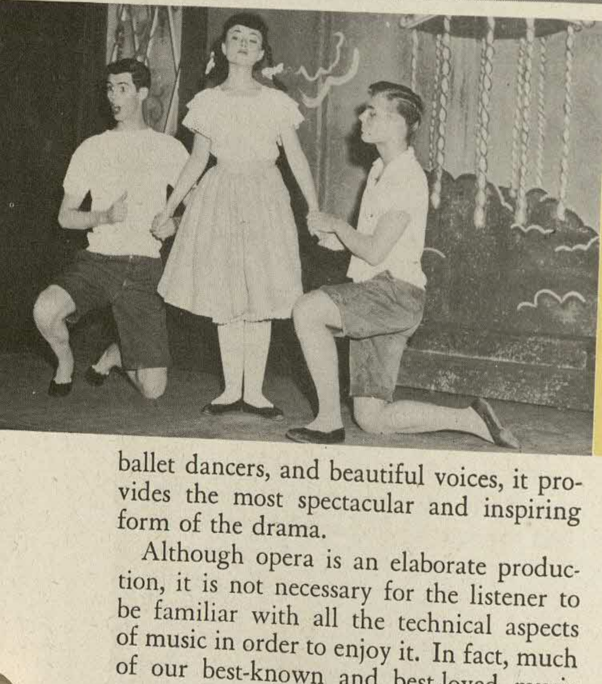
Mexican onyx is a variety of marble that has variegated colors in bands and patterns, used for ornamental table tops, vases, and clocks (see MARBLE).

O'PAL. Prized for their brilliant display of lively color, opals are valuable precious stones composed of silica. They differ from quartz stones in that they have some water in their composition.

The colors of opals are refracted from the interior of the stone by parts that differ slightly from the main mass. Some stones that exhibit splendid red and yellow reflections are called *fire* opals. More common varieties lack the play of colors and may be of a variety of tints, but are not desired as gems. Iridescent black opals are very highly prized. A superstition that opals bring bad luck keeps many people from wearing them. Most of the stones sold in the United States come from Mexico. Opals are also found in Hungary, Canada, Australia, and Honduras.

OPEN SHOP. In an industry or individual enterprise, open-shop conditions are said to exist when employment is not restricted to members of trades unions, but is open to any man or woman who wishes to work. The opposite term is *closed shop,* referring to the practice of admitting only union members to employment. See LABOR ORGANIZATIONS; STRIKE.

OPERA. Drama set to music is called opera, and the type known as grand opera has brought forth some of the greatest music ever composed. In grand opera every word is sung; there are no spoken lines. With its elaborate stage settings, gorgeous costumes, huge cast, fine orchestra,



Sedge LeBlanc; National Music Camp

OPERA IS FOR EVERYONE

The world-famous Metropolitan Opera Company (above) sings *Aida*, a love story of ancient Egypt. In college workshops (left), young opera students learn both traditional and modern operas. This scene is from *In a Garden* by the American composer Meyer Kupferman.

ballet dancers, and beautiful voices, it provides the most spectacular and inspiring form of the drama.

Although opera is an elaborate production, it is not necessary for the listener to be familiar with all the technical aspects of music in order to enjoy it. In fact, much of our best-known and best-loved music comes from opera, and we hear it constantly without always realizing its origin in grand opera. Most people today are familiar with such selections as the *Toreador Song*, from *Carmen; My Heart at Thy Sweet Voice*, from *Samson and Delilah;* the *Intermezzo*, from *Cavalleria Rusticana;* the *Last Rose of Summer*, from *Martha; Song of the Evening Star* and *Pilgrims' Chorus*, from *Tannhäuser;* the *Bridal Chorus*, from *Lohengrin;* the *Barcarolle*, from *Tales of Hoffman;* and the *Anvil Chorus*, from *Il Trovatore.*

In modern American usage, opera falls into several classes: grand opera, in which all the lines are sung and which is generally of a tragic nature; light opera, or comic opera, which includes lines that are spoken as well as lines that are sung (see COMIC OPERA); musical comedy, an off-shoot of comic opera; and the operetta, a romantic type of light opera.

History of Opera. Until the sixteenth century, there was almost no serious music heard except in the churches, where unaccompanied choruses sang liturgical compositions. But with the Renaissance came a new interest in dramatic and instrumental music, and Italians soon began experimenting with combinations. At one time, plays were enacted while a chorus sang behind the scenes, but in the sixteenth century Peri wrote music for the classical story of Daphne. The actors sang, and there was an orchestra consisting of a harpsichord, a harp, a viol di gamba (ancestor of the violoncello), and a lute. This first effort included no melody, depending entirely on the recitative (spoken lines accompanied by music). By the next century, however, definite melody had been introduced, and the aria (operatic song) had arrived. Toward the latter part of the seventeenth century, opera became a lavish pageant.

Opera as we now know it begins with Christoph Willibald Gluck, a German. Arias had become only a series of solos for star singers, and the drama itself had suffered. Gluck set about to restore the dramatic strength. From his work there developed three distinct schools of operatic composition—Italian, French and German. It is difficult to make precise distinctions but it may be said that the Italian school stresses the aria; tends to disregard the unity of orchestra, singers, and drama; the French stresses the drama, so that the music assumes the nature of an accompaniment; the German is a thorough effort to put all three on an equal basis. In the Italian school the chief exponents are Rossini, Donizetti, Verdi, and Puccini; in the French, Gounod, Bizet, Auber, and Meyerbeer; in the German, Mozart, Beethoven (whose operatic reputation rests on a single work), and Richard Wagner, the supreme master of operatic form.

Wagner is practically a school by himself, since his skill at unifying the elements of his music dramas is unique. He evolved several special techniques, including the principle of the *leitmotiv,* whereby characters and dramatic factors are indicated by distinct themes, many of which run through more than one opera, appearing and reappearing in altered forms.

HIGH POINTS FROM FAMOUS OPERAS

Poetry, suspense, and music are masterfully blended in Wagner's heroic operas. Left, the stellar rôle in his *Der Ring des Nibelungen* is that of Brunhilde. Above, the scene in his *Tristan und Isolde,* where the hero comes to Isolde as a minstrel.

The operas played most frequently today include: *Lohengrin, Tannhäuser,* and *The Ring of the Nibelungs* (a cycle of four operas) by Wagner; *Carmen* by Bizet; *Aïda, La Traviata, Il Trovatore,* and *Rigoletto* by Verdi; *Faust* by Gounod; *Jewels of the Madonna* by Wolf-Ferrari; *La Tosca, La Bohême,* and *Madame Butterfly* by Puccini; *Cavalleria Rusticana* by Mascagni; *Lucia di Lammermoor* by Donizetti; *Barber of Seville* by Rossini; *Manon* and *Thaïs* by Massenet; *Samson and Delilah* by Saint Saëns; *Martha* by Von Flotow; *Tales of Hoffman* by Offenbach; *Mignon* by Thomas; and *I Pagliacci* by Leoncavallo.

See the following articles:

Bizet, Georges
Gluck, Christoph W.
Gounod, Charles F.
Mozart, Johann C.
Offenbach, Jacques
Verdi, Giuseppe
Wagner, Wilhelm R.

O'PIUM. Like so many other useful things, opium has been misused until it is a curse to civilization. A valuable drug when administered as a narcotic by a physician, it is an evil "dope" in the hands of people who have become addicted to its use because of its pleasant aftereffects. Legitimately used by a physician, it relieves pain and sleeplessness; used by a drug addict, it eventually causes moral, mental, and physical decay.

Opium is the dried juice of a species of poppy grown in Eastern Europe and in Asia, particularly in India, China, Iran (Persia), and Turkey. Small incisions, or cuts, are made in the plump, green seed pods of the growing plant, and from these pods a milky juice flows. Every two or three days this sticky juice is gathered. It is then dried in the sun until it is of the proper consistency for kneading and molding. Then it is dried again in the sun until it is in solid cakes. Opium preparations, called *opiates,* are codeine, heroin, laudanum, morphine, and paregoric, all of which have medicinal uses.

The Opium Wars. During the early part of the nineteenth century, when China was being opened up to the Western World, the viciousness of the opium habit began to make itself apparent in China. Accordingly, the emperor forbade the importation of the drug from India, the chief producer. In 1840 a shipload of the drug valued at $10,000,000 was dumped into Canton Harbor, and a war broke out between England and China. A similar struggle followed in 1855. In the end, China was forced to pay for the damage, to make the importation legal, and to permit the growth of the opium poppy. Not until 1906 did China secure the co-operation of England in gradually reducing both production and importation.

Control of Opium. The illicit use of opium is an international problem. The first international conference on the subject convened at Shanghai in 1909 at the suggestion of President Theodore Roosevelt. In 1914 the United States Congress passed the Harrison Narcotic Act, to regulate domestic manufacture of opium and its derivatives, and followed it in 1922 with the Jones-Miller Act, setting up a Federal Narcotics Control Board. These acts attempt to control distribution, use, and importation of opium in the United States and outlying possessions. The League of Nations tried to stop the world opium trade and the United Nations has made strong efforts to end it.

This little 'possum was caught not "playing 'possum."

OPOSSUM, *o pos'um.* The strange creatures known in the South as *possums,* of which there are several species, are the only American representatives of an ancient group of mammals whose young, born in a very immature condition, are cared for in an external pouch on the abdomen of the mother (see MARSUPIALS). Their few living relatives, such as the kangaroos, occur only in the vicinity of Australia.

Opossums prowl about at night in woods, along streams and marshes, in search of their simple but highly varied food, which consists of berries, nuts, and other wild vegetable matter, insects, reptiles, small mammals, and birds, including the eggs and young. At times they help themselves freely to poultry, corn, sweet potatoes, and other farm products.

They make their homes in hollow trees and logs and under sheltering banks. In winter they may be found snugly curled up in a dense, warm bed of leaves. When attacked or startled, they have the most remarkable ability to go limp and simulate dead creatures; they permit themselves to be roughly handled while thus "playing possum" without evincing the slightest sign of life. The appearance of being dead is emphasized by the whitish face, the grizzled, gray coat of coarse hair, and the scaly, almost hairless, tail. Left alone, they quickly show signs of life and amble away to safety.

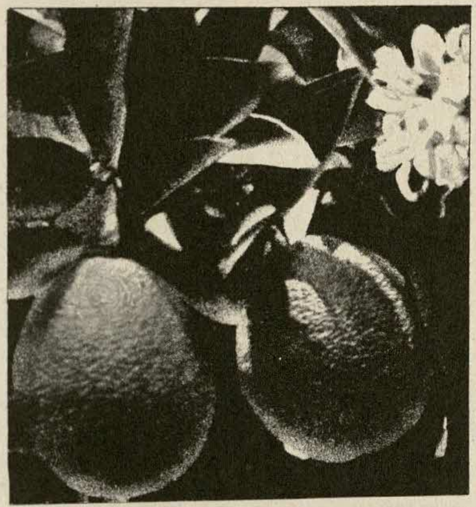
Opossums climb trees readily, and pursuing them with dogs is a favorite sport among the colored population of the Southern states, to whom the roast flesh is a great delicacy.

OP'TIC NERVE. See EYE.

OPTICS. See MIRROR.

ORACLES, *or'a k̨'lz.* For guidance and advice, the ancient Greeks always consulted their gods and goddesses before they embarked on some adventure or enterprise. The name oracle was used both for the temple of the god and the advice given by the priest or priestess of the temple.

Usually the advice given by the oracle was vague and obscure, capable of being interpreted in a number of ways. But the oracles were effective, and almost every proposed action in Greece was first subjected to the approval of the oracle. Among the famous oracles were those of Zeus at Dodona, and of Apollo at Delphi and at Delos. Egypt, too, had oracles, and the Romans used both Greek and Egyptian oracles for their guidance. See DELOS; DELPHI.



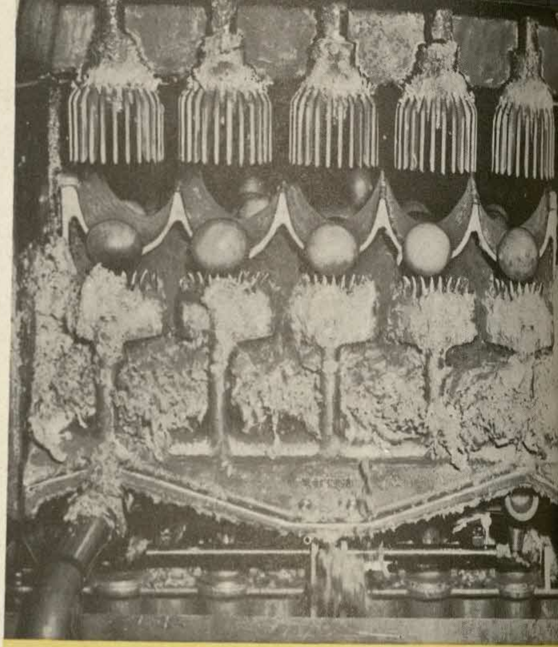
GOLDEN FRUIT OF THE TROPICS

Fruit is often found on California orange trees during the blossoming season: the blossoms appear in March, April, and early May.

ORANGE, *or'enj.* One of the most delicious and healthful foods is the familiar round, bright-yellow orange, a citrus fruit (see CITRUS). It is skinned and eaten as a whole fruit; its juice is squeezed out and consumed almost as a universal breakfast drink; it is sliced and used in salads; it is the source of oil used as a flavoring liquid; its peel is candied and eaten as a confection; it is made into delicious marmalade and jelly; in fact, it is used in innumerable ways.

Oranges were originally grown in Asia, and in time they were grown also in the Mediterranean countries. The Spaniards, in 1565, introduced the orange in Florida and along the Amazon in South America. The production of the fruit has been taken to the Gulf states, to Arizona, and to California, which now leads the field. Cuba, Puerto Rico, Japan, Palestine, Spain, and Italy are important orange-growing countries.

Description. The orange tree seldom exceeds thirty feet in height; it is usually kept much lower by pruning. It has broad, green, waxy leaves and white, waxy blos-



United Press

ORANGE JUICE FOR HEALTH

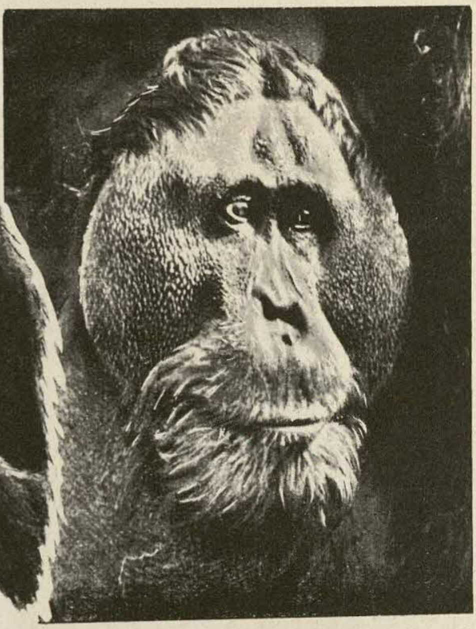
Golden globes of Vitamin C are picked ripe and rushed to the cannery, where they are chopped into pulp (above) and the juice is extracted, canned, and frozen.

soms. Because of their fragrance and beauty, orange blossoms are the traditional floral decorations at weddings.

The fruit of the plant is round and a deep yellow in color. It is composed of pulpy, juice-filled segments, some varieties of which contain seeds. Among the most popular oranges today are the navels, a seedless variety introduced into the United States from Brazil and now widely grown in California. Another variety is the blood orange, so-called because of its reddish juice. Related to the oranges are the mandarins. The tangerine, smaller and more flattened than the orange, is a type of mandarin grown with great success in Florida.

Orange trees are usually grafted on sour-orange roots, which are resistant to rot. They grow from seeds and thrive best in warm, well-drained soil. They are planted about twenty-five feet apart, and in California the soil is usually irrigated. A good tree will bear from 400 to 1,000 oranges. The fruit is clipped, not pulled, from the tree and is usually harvested slightly green. After being thoroughly washed, the oranges are placed in air-tight rooms with a temperature of about 85° F. When ripe, they are again washed, dried, graded, sized, and packed. Average fruit runs from 176 to 200 to the box. Today a considerable portion of the annual crop is marketed in the form of frozen, concentrated juice. California produces about two thirds of the annual crop in the United States, while Florida produces most of the remainder. Minor producers include Texas and Arizona. Sudden frosts are a serious threat to orange groves, reducing the yield or destroying whole crops.

ORANG′-UTAN′, or ORANG′-OU-TANG′. Second in size to the gorilla among the manlike apes, the orang-utan is found chiefly in Borneo and Sumatra. Its coarse, brownish-red hair covers all parts of the body except the face. Attaining a height of four to five feet, the orang-utan is incapable of walking perfectly erect. Its arms reach to its ankles, and the hind legs are short and bowed. Although it swings easily in the trees, it is rather awkward on the ground. Strong and intelligent, it can



LONG-ARMED APE
While considered less intelligent than the gorilla and the chimpanzee, the orang-utan is capable of learning many tricks. The full-grown males are known as ferocious fighters.

be easily tamed and taught if captured young. The animal feeds on fruit and lives in trees. See APE; MONKEY.

ORATION. From Demosthenes to Webster, critical times in history have produced great orators, and great orations have changed the course of history. For speech sways the thoughts of men; and the oration is a formal, dignified public speech meant to persuade, to please, or to convince the listeners.

Because the gift of speech brought power, the oration was the first literary form to reach high perfection. It developed swiftly in the popular deliberative assemblies of early democracies of ancient Greece and Rome. The American Revolutionary period developed the oratorical gifts of such men as Pitt, Burke, Patrick Henry, James Otis, and Alexander Hamilton.

The United States Congress witnessed some of history's greatest orations in the years preceding the Civil War, on the issue of slavery. These times brought such matchless speakers as Webster, the Northerner, Calhoun of the South, and Clay, who sought a compromise that would perpetuate the Union. Abraham Lincoln's *Gettysburg Address,* brief but weighted with deep significance, is regarded as the greatest in the nation's literary annals. The late William Jennings Bryan ranked high among the orators of his day, as does Winston Churchill, English statesman, among modern orators.

ORATO'RIO. Based on subjects usually taken from the Scriptures, oratorios are musical dramas in which the singing and the instrumental accompaniment are depended upon to tell the story. Oratorios are traditionally of a religious nature. Handel's *Messiah* is perhaps the most famous of all oratorios; others are *The Creation* and *The Seasons,* by Haydn, *Saint Paul* and *Elijah,* by Mendelssohn, and *Passion According to Saint Matthew,* by Bach.

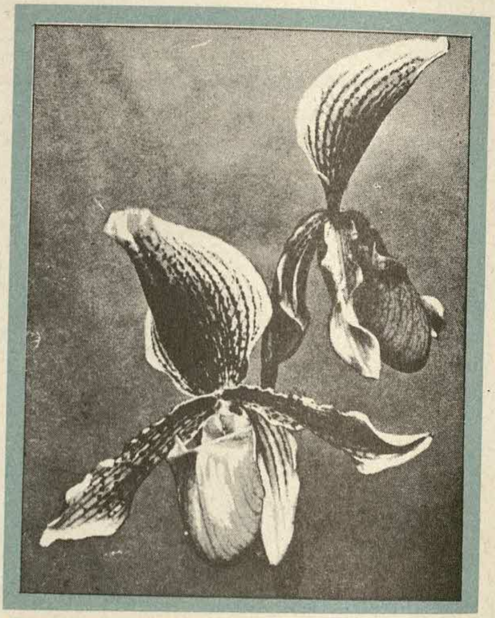
ORCHESTRA, *or'kes tra.* Any group of more than eight musical instruments which includes strings may be called an orchestra. Smaller ensembles are indicated by number, such as a trio or a quartet. The term orchestra is borrowed from a Greek word designating the space in a theater between the audience and the stage, which was occupied by the chorus.

Generally speaking, orchestras fall into two categories: dance orchestras and symphony orchestras. The difference is that music played by the dance orchestra is a means to an end, that is, dancing; while that played by a symphony orchestra is an end in itself. The dance orchestra usually has many wind instruments in proportion to strings, thus producing brilliance and pronounced rhythm. Any combination of instruments may be used to produce the desired tonal color.

But the symphony orchestra exists to produce music for listeners; its purpose is to interpret the feeling of the composer and to satisfy the hearer's emotional expectations. To meet these requirements, the orchestra is far larger than the dance group, and is arranged with definite regard for an instrumental balance based on the volume and timbre of the instruments themselves. Because violins, for instance, are softer than trumpets, the orchestra has twenty or thirty violins and a maximum of four trumpets. This proportion is carried out with all the instruments.

Among the orchestras in the United States which have attained wide recognition are the New York Philharmonic, the Boston Symphony, the Philadelphia Symphony, and similar organizations in other large cities. See MUSIC.

ORCHIDS, *or'kidz.* A distinct family, the orchids are very different from other plants. They often grow upon trees, and send long, corky roots out into the air, from which they obtain their food. At the same time they are not parasites, for they do not obtain food from the trees upon which they live. At the base of their leaves many of the orchids have huge bulblike organs, called *pseudo-bulbs,* which store water and from which water can be extracted during a dry season.



RARE AND LOVELY BLOOM
Botanists have risked their lives seeking rare species of unusually scarce or beautiful orchids.

The delicately colored flowers assume shapes like pigeons, butterflies, pansies, insects, and many other curious forms. They have wonderful natural devices which entice insects, so that pollen may be carried from one flower to another. The pollen is not powdery as in most plants, but is sticky and formed in small balls. From the seed pod of a certain orchid, oil of vanilla is obtained (see VANILLA).

Orchids are expensive plants because they grow slowly from seed and cannot be increased rapidly. Until recently, they have always been collected from the wild forests of the tropics. Not all species are tropical, however, for there are many lovely native orchids in the woods of the Northern states. The tropical species are larger and more brilliantly colored. The native orchids, unlike some of the orchids grown by the florist, grow in the soil instead of being found high up in trees. See AIR PLANTS; LADY'S-SLIPPER.

ORDER. In botany and zoölogy, the term *order* is generally applied to a group of families having close similarities. Families are made up of groups of genera (plural of *genus*). See FAMILY; GENUS.

ORDER OF THE BATH. See KNIGHTHOOD, ORDERS OF.

ORDER OF THE GARTER, or ORDER OF SAINT GEORGE. See KNIGHTHOOD, ORDERS OF.

OR'DINANCE OF 1787. Sometimes called the "greatest and most important legislative act in American history," the Ordinance of 1787 provided a plan of government and prepared the way for the settlement of the territory northwest of the Ohio River. It was adopted by Congress, July 13, 1787.

According to the ordinance, the temporary government was to consist of a governor, a secretary, and three judges, appointed by Congress. A legislature was to be formed as soon as there were 5,000 citizens qualified to vote; and the territory would be represented in Congress by a member in the House of Representatives, who, however, would not have a vote. Among the other provisions were guarantees of religious freedom, trial by jury, the right of habeas corpus, and proportionate representation in the legislature. It forbade slavery, encouraged education, and declared that the territory should always remain a part of the United States. See NORTHWEST TERRITORY.

ORD'NANCE. See ARTILLERY; CANNON.

ORE. In a broad sense, almost any mineral, mineral mixture, or rock from which some constituent may be extracted profitably is an ore. The term is also used to cover similar aggregations that, it is believed, will be of value in the future. In the more common usage, the term is restricted to mineral mixtures or rock from which a metal can be extracted with profit.

Occurrence of Ores. Metallic ores occur in different types of deposit. The world's most important ores of copper and iron are great masses of altered rock in which the valuable metal has either been introduced by water solutions or has been enriched by the leaching out of valueless minerals. Other ores are rocks in which a valuable amount of metallic mineral was deposited when the rock was formed—not introduced by solutions later.

Another common type of ore deposit is that found in veins (see VEIN). In this type, fissures in rocks are filled with minerals deposited from water solutions. Valuable minerals deposited by streams from material eroded from ore veins and rocks are called *placer* deposits, but are not usually classed as ores. Gold, platinum, and tin are the metals most commonly taken from such deposits. See COPPER; IRON; GEOLOGY; METALS AND METALLURGY; MINERALS AND MINERALOGY; MINING.

Oregon State Highway Travel Division

OREGON'S CAPITOL
This white marble capitol is located in Salem.

OR'EGON. Facing the Pacific Ocean and stretching far inland, with its surface covered with dense, green forests, snow-clad mountains, and wide, fertile valleys, Oregon has been highly favored by nature. Beginning with the early days of the nineteenth century, fur trader, hunter, lumberman, farmer, and fisherman beat a path over the famous Oregon Trail to this virgin wilderness, attracted by its wealth.

A rich fur trade, controlled largely by the Canadians and the Hudson's Bay Com-

ONE OF OREGON'S NATURAL WONDERS
Six thousand feet up in the Cascade Mountains is Crater Lake, its water of an indescribable indigo blue being contained in the crater of an extinct volcano, Mount Mazama. Accumulations of rain and snow have made the lake in places 2,000 feet deep.

pany, was the first attraction. Later the lumberman came to exploit the fir and pine forests. Fishermen soon found that the Columbia River was the greatest salmon fishing ground in North America. In the middle of the last century, settlers swarmed to the rich Willamette Valley, which is today one of the most productive agricultural regions in the nation.

To the north of Oregon, across the Columbia River, is the state of Washington; Idaho forms the eastern boundary; and Nevada and California, the southern boundary. The state covers an area of 96,981 square miles, ranking tenth among the states.

Mountains, Streams, and Plains. Along the Pacific lies a narrow, fertile coastal region sloping upward to the Coast Range mountains, a low range extending from north to south in the western part. On the east, the Coast Range dips down to the famous Willamette Valley. Beyond this valley rise the steep Cascades, dominated by beautiful Mount Hood, 11,225 feet in altitude. Both the Cascades and the Coastal Range are heavily forested. Sloping away from the eastern foothills of the Cascade Mountains is a broad plateau section which extends half the width of the state. In the north it merges into the Blue Mountains.

The plateau region has a broken and rolling surface, with a long slope to the north and a shorter south slope. The mighty Columbia River forms about two thirds of the boundary of the state, and its tributaries, the Snake, the John Day, and the Deschutes, drain the northern slope of the plateau and the region east of the Blue

Mountains. The Willamette is also a tributary of the Columbia. Several short rivers drain the southwestern and southeastern areas.

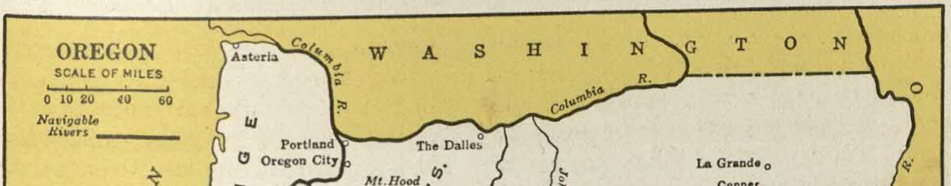
Climate. The ocean on the west and the mountains in the interior greatly affect the climate. The ocean modifies the heat and cold, while the mountains increase the rainfall on the Pacific slopes and decrease it in the interior. Western Oregon has cool summers and mild winters. The rainfall varies from about forty inches in the Willamette Valley to more than 100 inches in the coastal regions. Central and Eastern Oregon have greater extremes of temperature and scanty rainfall, ranging from two to twenty-five inches.

Natural Resources. The greatest resource in Oregon is the forests, which comprise about one fifth of the uncut timber in the United States. The most valuable timber is the Douglas fir, which is found west of the Cascade Mountains. Spruce, yellow pine, cedar, hemlock, oak, and maple are also found.

The Columbia River is recognized as one of the greatest fishing streams in the world. Thousands of people are employed in securing and caring for the salmon catch of this stream. In the coastal waters of the Pacific there are abundant supplies of sturgeon, halibut, and oysters.

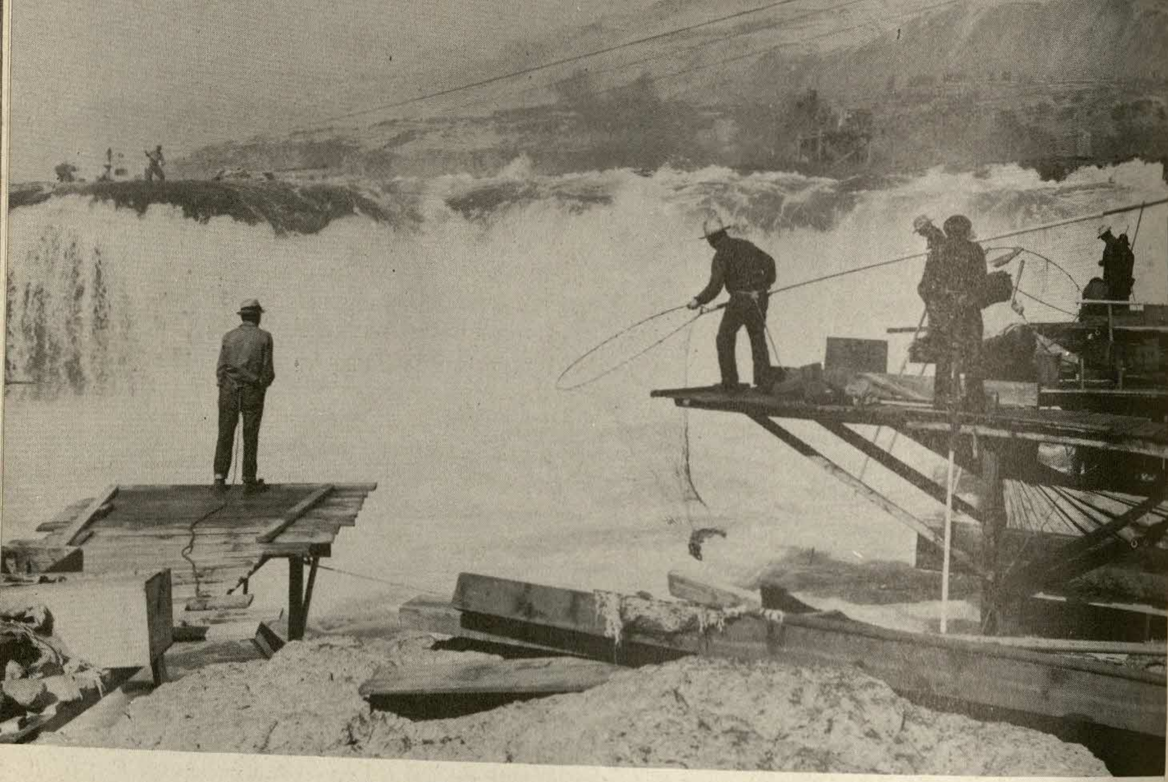
Although Oregon has varied mineral resources, there is not a great deal of mining within the state. The chief minerals are gold, which is found chiefly in the Blue Mountains, silver, copper, lead, granite, gypsum, platinum, and clay. Only small amounts of coal and iron are found. The value of the state's mineral output has varied widely over the years.

Farming in Oregon. Agriculture is the most important industry in Oregon. The Willamette Valley, with its rich soil and favorable climate, is the most productive farm region in the state, although it is nearly equaled by the Hood and Rogue river valleys. On the fertile alluvial soils in these valleys great crops of fruit and grains are harvested each year. Apples, pears,



OREGON'S SUNSET EMPIRE

The Cascade Mountains divide the state into two distinct climatic and geographic areas.



ANCESTRAL RIGHT DOOMED BY PROGRESS
Indians net salmon at Celilo Falls, an exclusive right granted to them in an early treaty. A dam at the Dalles near by doomed the Falls. Fish ladders help salmon go upstream.

peaches, strawberries, grapes, and walnuts are grown abundantly. The field crops include hay, hops, wheat, barley, rye, and corn. Potatoes are also raised extensively. In the plateau regions of the eastern part of the state there are extensive grazing lands that support a thriving livestock industry. Horses, cattle, and sheep are raised there in large numbers. In the more arid regions on the eastern slopes of the Cascades, irrigation is necessary for the production of crops.

Manufacturing and Commerce. Manufacturing in Oregon has been greatly aided by abundant water power, excellent water and rail transportation, and large supplies of raw materials. The greatest industry is that of lumbering, which is centered largely in the Columbia River basin. Another important industry is the preparation and canning of salmon and other fish. Other leading manufactures include flour, dairy products, canned goods, prepared meats, pulp and paper, and furniture.

Oregon has a well-developed commerce, of which Portland is the chief center. Although it is a hundred miles from the Pacific, it is a port for ocean-going vessels which ascend the Columbia River. In addition to more than 5,000 miles of railway lines, there are hundreds of miles of waterways and an excellent highway system including the famous Columbia River Highway. Generating stations at the Bonneville, the McNary, the Owyhee, and other dams provide hydroelectric power, the basis of the state's aluminum-refining industry.

The People and Their Government. With the development of timber resources and industries, people were attracted to Oregon. Its population is now about 1,774,000. Leading cities are Portland, Eugene, Salem, Medford, and Klamath Falls. Salem is the capital.

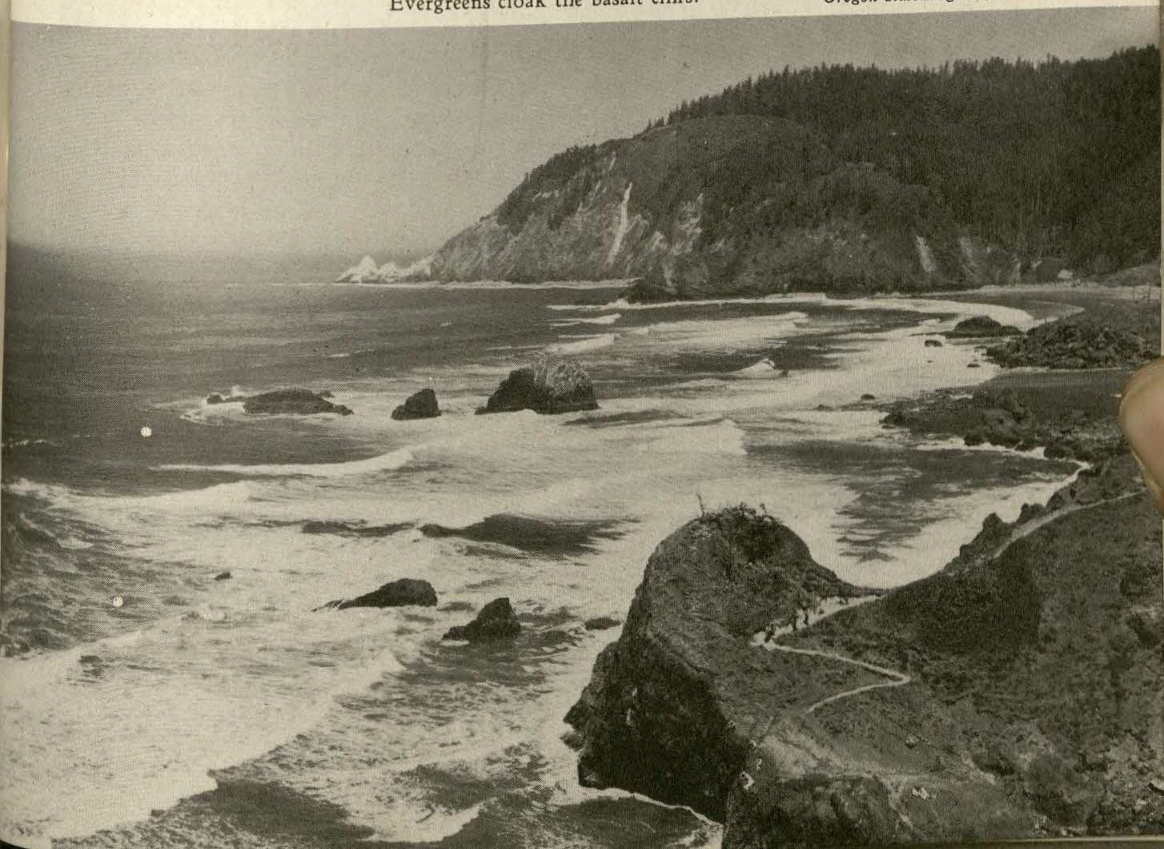
The people of Oregon elect a governor, a secretary of state, a treasurer, attorney-general, superintendent of public instruction, and labor commissioner. All serve four-year terms. These comprise the executive branch of the government. The legislature, which holds sessions every two years, is composed of a senate of thirty members and a house of representatives of sixty members. The senators serve four years and the representatives two years. A supreme court with seven members, and circuit, county, and probate courts make up the judicial branch of the government.

Education. The educational system of Oregon is one of the most progressive in the Union. The state maintains a university with a separate medical school, Oregon State College, and three normal schools. Among the private institutions of higher learning are Willamette University (Salem), Pacific University (Forest Grove), Clark College (Portland), Linfield College (McMinnville), Reed Institute (Portland), and Marylhurst College (Oswego).

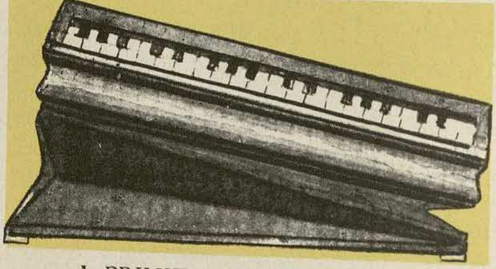
History. It is possible that Spanish explorers may have sailed as far north as Oregon in the sixteenth century, and that Sir Francis Drake may have reached its shores in 1579. In any case, no serious attempts at exploration of the northwest coast were made for over two years. In 1778 Captain Cook explored the Nootka Sound area, and Robert Gray in 1792 was the first to sail into the Columbia River. On his discovery were based future claims of the United States to the region. Following the Louisiana Purchase, Lewis and Clark crossed the continental divide and traveled the Columbia River to its mouth in 1805. The first American settlement, named Astoria, was founded as a fur-trading post by a company organized by John Jacob Astor in 1811, but two years later it was sold to a Canadian company.

In 1818, after the War of 1812, a British and American commission fixed the boundary from the Lake of the Woods to the Rocky Mountains at the forty-ninth parallel of latitude. The United States wanted it extended to the Pacific, but the final ar-

WHERE MAJESTIC DISTANCES BECKON
Ever-changing views of the blue Pacific greet the traveler along Oregon's coastal highway. Evergreens cloak the basalt cliffs. *Oregon State Highway*



rangement was for joint control of disputed territory, including what is now Oregon. This agreement was continued indefinitely by treaty in 1827; but by 1844 the boundary dispute between the United States and Britain was acute. The Americans claimed that the international boundary line should be set at 54° 40′ north, while the British claimed the Columbia River as the boundary line. In 1846 a treaty was signed, setting the line at 49° north, and making the Oregon territory indisputably American. Oregon was organized as a territory in 1848, and in 1859 was admitted to the Union as a state. See COLUMBIA RIVER; LEWIS AND CLARKE EXPEDITION; SALEM; PORTLAND.



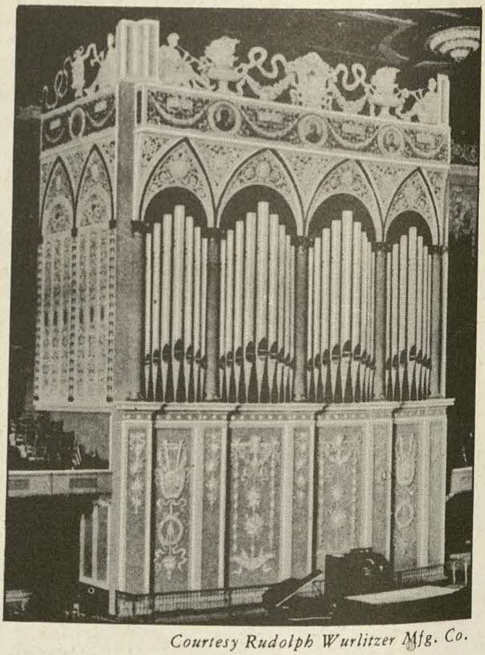
A PRIMITIVE REED ORGAN
In this early type, pressure of the player's hands worked the bellows, sent air to the reeds.

OR′GAN. The modern pipe organ, most magnificent of musical instruments, is really little more than a colossal pipes of Pan. It consists of a chest of compressed air, a set of pipes, and a keyboard for controlling the passage of the air to the pipes. The first organ dates back to about the second century B. C., and succeeding years have brought continuous improvement.

Today the air is compressed by a blower operated by an electric motor, and the valves which let the air into the pipes are electrically controlled. This work was once done by a series of levers, and in a large organ there was a virtual forest of sticks and pivots for playing. Big organs have a large number of sets of pipes for producing different tones and different registers, and the keyboard may be connected to any one or any group of sets by stops. Big organs have as many as a hundred stops, and nearly all include the open, stopped, and double diapasons; the dulciana, melodia, salicional, flute, and vox humana. For complete control, large organs are equipped with as many as five keyboards, or *manuals,* and a foot-operated keyboard. These keyboards are called the great, swell, solo, choir, echo, and pedal organs. There are two kinds of pipes, the flute and the reed, each with a different quality, depending on its shape and material. By varying the size of the pipes, builders give organs ranges from the lowest to the highest notes. And the instruments are capable of inspiring volume and tonal brilliance.

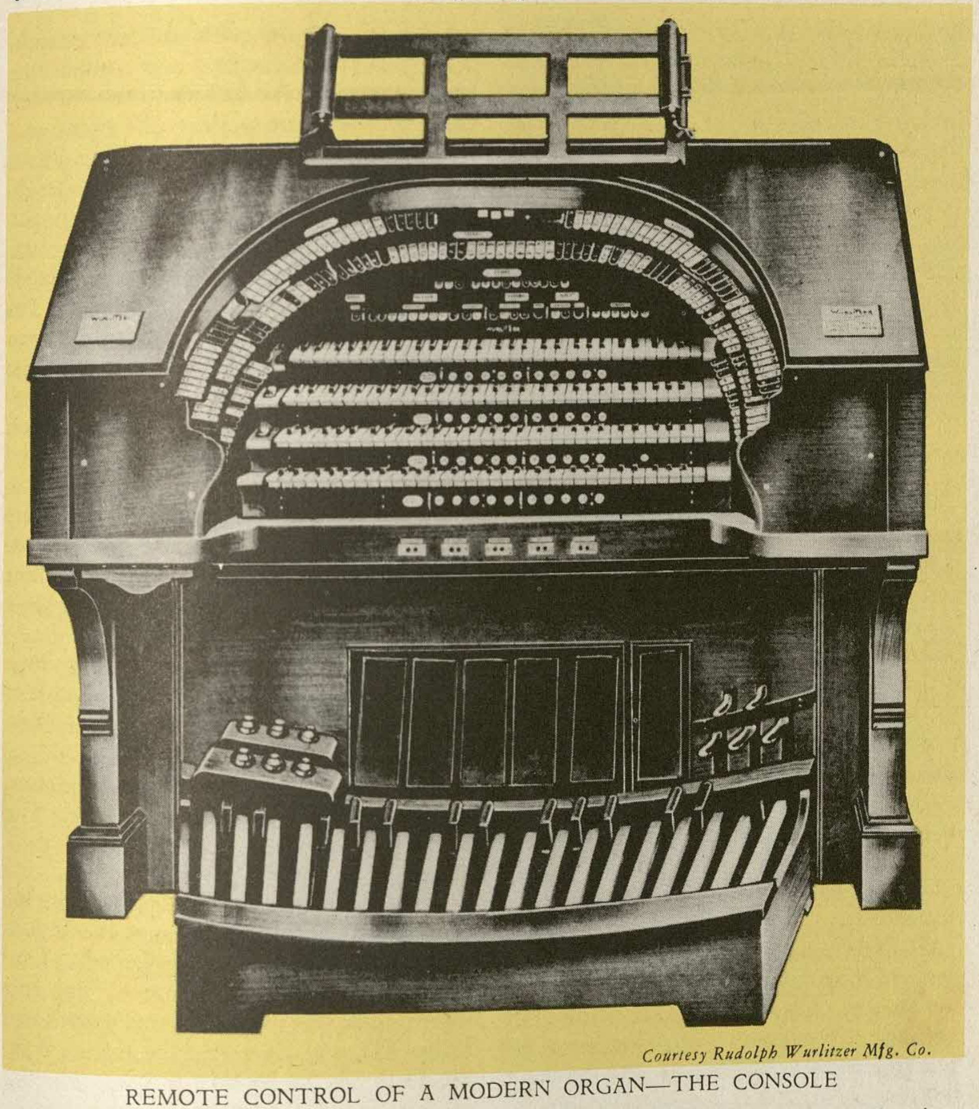
Among the world's largest organs are those of Saint Peter's in Rome; Notre Dame Cathedral in Paris; the Riverside Church in New York; the University of Chicago Chapel; and the Mormon Tabernacle, Salt Lake City.

One of the modern developments is an instrument called the electric organ. It requires no pumping of air; the tones are produced by electricity applied directly.



Courtesy Rudolph Wurlitzer Mfg. Co.

VOICE OF A GREAT ORGAN
This organ contains pipes from three-quarters of an inch to thirty-two feet long.



Courtesy Rudolph Wurlitzer Mfg. Co.

REMOTE CONTROL OF A MODERN ORGAN—THE CONSOLE

ORINOCO, *o ri no' ko.* Ranking third among the rivers of South America, the wandering Orinoco River, together with its tributaries, drains most of the densely forested area of the northern part of the continent. It rises in the foothills of the Colombian Andes and dashes eastward in a number of streams which join at the border of Colombia and Venezuela. From this point the stream flows almost due north for 300 miles, suddenly veering east through the heart of Venezuela and emptying its vast volume of water into the Atlantic near British Guiana. The main stream of the river is about 1,500 miles long. Its mouth splits into fifty branches, forming innumerable deltas covering an area of some 7,000 square miles.

On both sides of the river lie dense inaccessible forest regions, while 700 miles upstream the traveler encounters the Cariben Rapids, above which the stream may again be navigated. There is little commerce on the Orinoco, the chief trading center being Ciudad Bolivar, 260 miles from the mouth.

"BASKET-MAKER" SONG BIRD
Nicknamed for its nest—the orchard oriole.

O'RIOLE. In America, orioles are brightly colored birds of the blackbird family that build beautiful, woven, hanging nests. Three species occur in both the United States and Southern Canada. The brilliant orange and black *Baltimore* oriole is described elsewhere under its own title. In the West there is the *Bullock's* oriole, which has yellow on the sides of the neck and head; and in the South is found the *orchard* oriole, a bird with chestnut and black feathers. The female orioles are not so colorful as the males. They all feed largely on insects, thereby being useful as well as decorative.

ORI'ON. Legends of ancient Greece tell us that Orion, a giant hunter, was an unfortunate hero. He loved Merope deeply; but when he endeavored to carry her away, he was blinded by her father. Hephaestus took pity on him and had a guide lead him to the rising sun, thereby restoring his sight.

Then Artemis, the sister of Apollo, fell in love with him, angering Apollo, for Orion was only a mortal. Apollo planned to destroy Orion. One day he pointed out a dark object in the water and challenged Artemis to hit it with an arrow from her bow. Artemis took aim and struck the object, but to her horror discovered that it was Orion's head. Grief-stricken, she placed Orion and his dog Sirius in the sky as a constellation—the brightest in the heavens. (See article following.)

ORION. On the celestial equator east of Taurus is Orion, the brightest constellation in the heavens. According to the ancients, this group of stars outlines the figure of a man with a sword at his side. His belt is formed by three stars; three other stars directly below surround a peculiar hazy spot. When studied through the telescope, this haze, or nebula, is magnificent; this nebula can also be seen with the naked eye. The right shoulder of Orion is marked by a red star, Betelgeuse; at the left foot appears a blue star, Rigel. Both are of first magnitude. See chart accompanying the article CONSTELLATIONS.

ORK'NEY ISLANDS. Sixty-seven islands just north of Scotland form the group called the Orkney Islands. They constitute a county of Scotland and comprise an area of 376 square miles. Only twenty-nine of the group are inhabited, the rest being rocky islets capable of supporting little vegetation. The climate is moist and temperate, and the soil generally fertile. Oats, turnips, barley, and potatoes are the leading crops. Scapa Flow, a channel in the islands, is an important British naval base. The Germans sank their fleet here, after their surrender in the First World War.

ORLEANS, *ohr la ahN'*. Two branches of the royal family of Orleans, the Valois-Orleans and the Bourbon-Orleans, have occupied the throne of France. The first sovereign of the Valois-Orleans branch was Louis XII, who ascended the throne upon the death of Charles VIII in 1498. The last of this line was Henry III, who died in 1589. For Bourbon-Orleans, see BOURBON. See VALOIS.

ORLEANS, MAID OF. See JOAN OF ARC.

ORNITHOL'OGY. The science of birds, ornithology is a branch of zoölogy treating of the classification, habits, and description of birds, and their relationship to man. See BIRDS.

ORSINI, *or se' ne*. A powerful Italian family, the Orsini rose to prominence in about the eleventh century and continued to exert influence in Italian religious and military affairs for several hundred years.

Many of the Orsini became important military leaders, and both Popes Nicholas III (1277) and Benedict XIII (1724) were members of this family. The family included many eminent statesmen and acquired many titles and honors. The Orsini were the bitter enemies of the Colonna, with whom they carried on a long feud.

ORTHOGRAPHY, *or thog′ ra fi.* Just as grammar deals with syntax and the proper use and relation of words within a sentence, so orthography is concerned with the proper spelling, pronunciation, division into syllables, and derivation of individual words. It is an important branch of the art of speaking and writing correctly.

Diacritical Marks. There are more sounds in the English language than there are letters. Obviously, then, some letters must represent more than one sound. Often two or more letters combine to produce special sounds. Symbols, or signs, are, therefore, used with certain letters to indicate which sound they represent; these symbols are diacritical marks.

Most diacritical marks are used to indicate the different sounds for vowels (*a, e, i, o, u,* and sometimes *w* and *y*). The vowel *a* has eight different sounds; *e, o* and *u* have six sounds each; and *i* has three sounds. The consonants (all the letters which are not vowels) also have variations of sound, although not nearly so many as the vowels have. The letter *c,* for instance may have the *k* sound as in *cake,* or it may have the *s* sound as in *ice.*

When two vowel sounds are blended together in one syllable, the result is known as a diphthong. The letters *oi* in *oil* and *ow* in *cow* are examples. Notice that there is more than one speech sound in each diphthong, even though the sounds are blended. In a digraph, however, two vowels, and occasionally two consonants, are pronounced together as only one speech sound, as *ai* in *rain* and *th* in *bath.*

Three vowel sounds blended together in one syllable make a triphthong, as *i* in *fire* and *ou* in *sour.* As you pronounce the *i* and the *ou,* you will discover that three speech sounds are required for each. On the other hand, a combination of three letters (either vowels or consonants) which together require only one speech sound is a trigraph. An example of a trigraph is the *eau* in *beau.*

Syllabication and Accent. Usually a syllable is composed of vowel and consonant sounds combined into a group. A vowel alone may serve as a syllable. In speaking, even a consonant may form a syllable, as in *kitten* (pronounced *kit′ ′n*); but in writing, a consonant alone is not a syllable, and *kitten* forms the syllables *kit* and *ten.*

In writing, it often happens that a word must be divided at the end of a line; such a division is made by inserting a hyphen at the end of the line. The word must be separated at the end of a syllable. A good rule to remember in dividing words is that if two consonants fall between two vowels, each of the consonants will usually go with the vowel next to it; if, however, a consonant occurs between two vowels, it usually goes with the second vowel.

When words have but one syllable, there is no accent; in such cases the correct pronunciation depends upon the proper sounding of the various letters of the word. In words of two or more syllables, however, the placing of the accent or accents is essential to correct pronunciation. A primary accent is a heavy accent. It is the one occurring in all words of two or more syllables. Many words have a lighter accent as well, called the secondary accent, as in math′ e mat′ ics. There are even some words with two primary accents. See SPELLING.

ORTHOPEDICS, *awr tho pe′ diks.* The branch of medical science that prevents or corrects crippling conditions and deformities, whether they be natural or caused by accident or disease, is known as orthopedics. It is a surgical specialty and makes much use of mechanical appliances and braces. Skin grafting, bone surgery and grafting, tissue transplanting, and the use of the X-ray and other electrical apparatus are aids in this science.

Such afflictions as tuberculosis of the

spine, bowlegs, hunchback, clubfeet, rickets, flat feet, curvature of the spine, and muscular paralysis of arms and legs can be helped by orthopedics. Special orthopedic wards for children are now maintained by modern hospitals.

OSAGE, *o' sage.* The richest Indians in the United States are the 4,000 members of the Osage tribe, living on a reservation in Oklahoma. These Indians, members of the Sioux family, once occupied territory in what is now Missouri, Arkansas, and Kansas. They sold their holdings, receiving good prices from the United States government, and later, in Oklahoma, made more money from royalties for oil discovered on their property.

OSAGE ORANGE. Long, vicious thorns, with which this tree is plentifully equipped, made the Osage orange useful as a hedge plant when the Middle West was first laid out in farms. It is in these old hedges that most of the remaining specimens are found. The typical Osage fence is fast disappearing, however, as the tree's long roots take food from too wide an area.

The natural range of the tree is limited to the region between Kansas, Missouri, and Texas, but the plants have been used extensively elsewhere and have not infrequently established themselves where planted.

The orange or yellow wood of the Osage orange is valuable, as it is very hard and durable, and is made into many kinds of woodenware. Formerly, it was considered most valuable for bows. The bark produces a dye. The fruit is inedible.

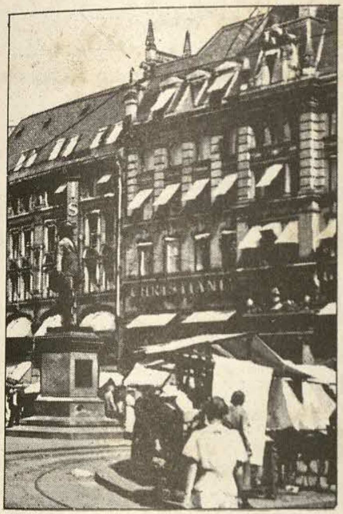
OSAKA, *o zah' ḳah,* JAPAN. A port city in the southeastern part of the Japanese island of Honshu, Osaka is the industrial and commercial center of Japan and its second city in size. Built on both sides of the Yodo River, it also has hundreds of canals, whence the name "Venice of the East." Here the old and the new are side by side, for towering above ancient temples and a castle are numerous large factories and office buildings. The leading industrial products are, normally, cotton, silks, glass, iron and steel, refined sugar, and other manufactured articles. With its deep, improved harbor, Osaka is one of the great ports of the Far East, and shipbuilding is a leading industry. Heavily bombed during World War II, the city recovered rapidly after the war. The population is about 2,632,000.

OSCEOLA, *os e o' lah* (about 1804-1838). One of the bitterest enemies of the white man, Osceola was a Seminole Indian chief whose father was an Englishman, William Powell; his mother was the daughter of a Creek chief. Osceola later became the leader of the Florida Seminole Indian tribe. When his wife, a half-breed slave, was taken away by her former owner, the chief turned against the white man, taking terrible revenge at every opportunity. In 1837 he was captured while carrying a flag of truce to General Jesup, and was kept prisoner in Fort Moultrie until his death.

OSIRIS, *o si' ris.* The source of all good and the king of the Egyptian gods, Osiris was the husband of Isis and the father of Horus. He appeared in the land of Egypt and established many beneficial laws. After his murder by his brother Set, the god of evil, he became the judge of the dead in the underworld. Osiris is commonly identified with either the sun or the Nile. His soul was believed to live on earth in Apis, the sacred bull. The worship of Osiris extended to Rome, where it was finally replaced by Christianity. See ISIS.

OS'LO, NORWAY. Lying at the foot of wooded hills at the head of Oslo Fiord, in southeastern Norway, is the ancient city of Oslo, capital, metropolis, and chief port of the country. It is also an industrial center, noted for its production of woolen goods, paper, leather, ironware, glass, and tobacco goods. There are in addition large shipbuilding yards and numerous machine shops. Oslo has an important foreign trade, its chief exports being timber, paper, and fish.

The town was founded in 1048, later becoming a leader in the Hanseatic League.



Courtesy Raymond-Whitcomb, Inc.

NORWAY'S FINEST CITY

Oslo, capital and hub of Norwegian fashion, is beautifully situated at the head of the picturesque Oslo Fiord.

In 1624 its name was changed to Christiania in honor of King Christian IV. In 1925 the ancient name Oslo was restored.

Oslo was captured by German troops on April 9, 1940, and was Germany's political headquarters during her occupation of Norway. King Haakon and his government evacuated the city and maintained an exiled regime in England until the liberation of Norway in 1945. Population, about 455,000.

OSMIUM, *oz' mi um.* The heaviest metallic element, osmium is blue-white to gray in color and is found in platinum ores. Twenty-two and a half times heavier than water, it has a melting point of 2,700° C., and is not affected by ordinary acids. It will form alloys with other metals and also will combine to form osmic acid, a strong oxidizing agent. It is one of the components of osmiridium, used in fountain-pen points. It was discovered by Tennant in 1803.

OSMO'SIS. If a bladder be filled with salt water and suspended in a vessel of fresh water for a time, osmosis will take place. This means simply that some of the salt water will pass through the bladder into the fresh water and, at the same time, a considerable amount of the fresh water will flow into the bladder. The outward flow is called *exosmosis;* the inward flow, *endosmosis.* Such an interchange of liquids will usually be unequal, the flow of the lighter to the denser liquid being the greater. As soon as the density of the two liquids is equalized, osmosis will cease. The force which causes this flow of liquids is known as *osmotic pressure.*

Osmosis is probably the most important process in the growth of plants. Because the osmotic pressure of a healthy plant is always greater than that in the soil, the plant is constantly ready to absorb water from the ground to replace that which transpires from the leaves. The water, together with other substances, will enter the cells of the plant through a thin membrane, but the protoplasm of the cells can reject any substance not needed. Thus only the necessary plant foods are absorbed; all others are rejected. See DIFFUSION.

OSPREY. See FISH HAWK.

OSTEOPATHY, *os te op' a thi.* Believing that the human body contains within itself the forces necessary to fight disease, Dr. Andrew Taylor Still of Baldwin, Kan., late in the nineteenth century began treating patients by a system of manipulating the body to restore normal blood circulation and nerve force to all its organs. He used no drugs. After practicing his method eighteen years, he founded, in 1892, a college of osteopathy at Kirksville, Mo., the first of several now training doctors of osteopathy. In some subjects the teaching is similar to that of traditional medical col-

BIGGEST BIRD IN THE WORLD

The ostrich sometimes attains a height of eight feet and a weight of more than 300 pounds.

leges, but emphasis is always placed on manipulation and adjustment of the body. The system has spread to other countries, and there are several thousand licensed osteopaths in the United States.

OSTRACISM, *os′ tra siz′m.* A person whom ancient Athenians considered harmful to the state was banished for a period of years (usually ten) by a public vote of ostracism. After ten years he might return and have all his rights restored. Themistocles, Aristides, and Cimon were famous men ostracized from Athens. Today the term refers merely to social exclusion. See ARISTIDES.

OS′TRICH. No other bird living today is as large as the ostrich, the great running bird of Asia and Africa, formerly hunted for its plumes. It stands seven feet high and weighs 200 to 300 pounds or more. It also differs from most birds in other respects. Each foot has but two toes; the wings are very small and useless for flight, although they help in running; the long neck and small head are nearly naked, having only a scanty down, while the strong legs and thighs are entirely naked. The male birds are black in body color, with white plumes on the wings and tail; the females are brownish gray.

At full speed, ostriches can outrun the swiftest horse. They are said to go at the rate of sixty miles an hour, each stride covering twenty to twenty-five feet. However, they have the curious habit of running more or less in a circle, and in chasing ostriches, men catch them by cutting across and thus saving distance.

In 1882 the first ostriches were brought to America and since then have been raised on farms in the South and West. Alfalfa is the best ostrich food, along with grain.

In the breeding season, if left alone, the male ostrich hollows out a place in the ground with his feet, and in this the females each lay ten to fifteen eggs. The ostrich egg is a creamy-white color, nearly smooth, or with pits all over the surface. It weighs about three and one-half pounds and is equal in content to two and one-fourth dozen hens' eggs. Ostrich eggs are good to eat. The male does much of the incubation, especially at night, and the eggs hatch in about six weeks. The young chicks are twelve inches high and grow very rapidly.

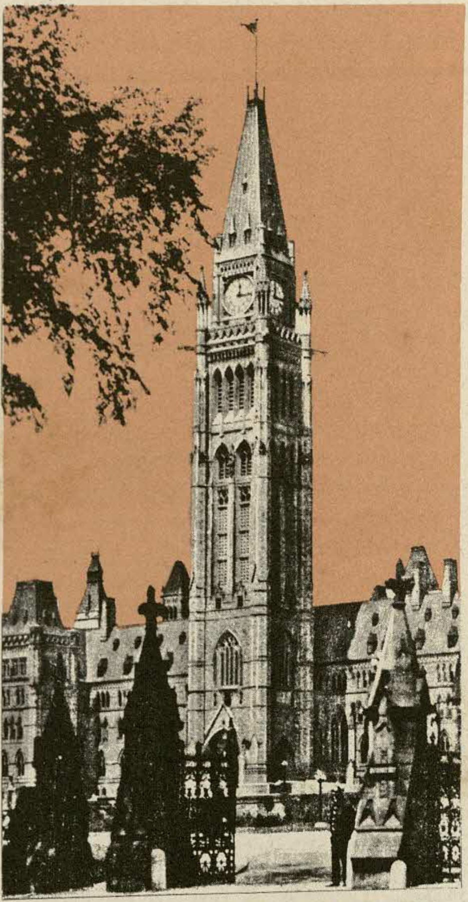
An ostrich bears its first set of plumes when six to nine months old, and after that it can be plucked every eight to eleven months. Since the birds live about forty years, it will be seen that they were valuable producers when ostrich-plume fans and millinery were in vogue.

The ostrich has a bad temper and can strike a terrible blow with its foot hard enough to kill a man; but it can kick only forward. When angry the ostrich roars like a lion, producing the sound by taking in a great quantity of air until the neck is swelled out like a balloon, then suddenly letting the air out with a terrific noise.

O'TIS, James (1725-1783). A capable and brilliant Massachusetts lawyer, James Otis won fame for his determined opposition to British policy in the American colonies. Born at West Barnstable, Mass., Otis was educated at Harvard College and practiced law in Plymouth and later in Boston. In 1761 he resigned his post as advocate-general of Massachusetts because he opposed the demand of British officers for search warrants, the hated "writs of assistance." From this time on, he became a leader of the patriot party. Later he suggested calling the Stamp Act Congress (1765) and was the author of the message which it sent to the House of Commons. He was also instrumental in checking many moves against colonial interest. See Writs of Assistance.

OT'TAWA. During colonial days in America, the Ottawa Indians, who lived on the Upper Ottawa River in Canada, were brought into numerous wars. Defeated by the Iroquois, many of them moved on to Michigan, Ohio, and Illinois. They were allies of the French, as were most Algonquian tribes. In the war of 1812 they aided the British, but after that they declined in importance. Pontiac was an Ottawa chief. Today most of the Ottawas live in Ontario and Michigan.

OTTAWA, Ont. In southeastern Ontario, in a fork formed by the junction of the Rideau and the Ottawa rivers, lies Ottawa, capital of the Dominion of Canada and seventh city in size in the Dominion. It is one of Canada's finest cities, with beautiful government buildings, numerous cathedrals and churches, a fine city hall, a splendid post office, the National Victoria Museum, the National Art Gallery, and the Library of Parliament, with 200,000 volumes. Here, also, are Ottawa University, Saint Patrick's University, the Provincial Normal School, two Collegiates, and numerous private institutions.


SYMBOL OF A NATION AT PEACE
Centrally located among the government buildings which dominate Ottawa is the Peace Tower.

Ottawa has numerous industries, many of which owe their growth to the power furnished by Chaudière Falls. Sawmills, paper mills, flour mills, clothing factories, foundries, brickyards, and many other industrial plants totaling over 200, provide work for thousands of people. Ottawa has excellent railway facilities, and access to the Great Lakes and the Atlantic is furnished by the Ottawa and Saint Lawrence rivers.

The city was founded in 1827 by Colonel By and was named Bytown. It was incorporated under its present name in 1854. Four years later it became the capital of Canada. Its present population is about 345,000.

OTTAWA RIVER. With a length of 685 miles, the Ottawa River is the chief tributary of the Saint Lawrence. It rises in the Laurentian Highlands of Southern Quebec, flowing westward to Lake Timiscaming, then veering sharply to the southeast and east, forming part of the Ontario-Quebec boundary. Just as it reaches the Saint Lawrence, it forks into two branches, forming an island that is the site of Canada's largest city, Montreal. The Gatineau, Lièvre, Madawaska, and Rideau are important tributaries.

Near Ottawa, the Rideau Falls block transportation, but access to Lake Ontario is provided by the Rideau Canal. Another proposed water route, the Georgian Bay Ship Canal between Georgian Bay and the Ottawa River near North Bay, was dropped with the outbreak of World War I.

FUR BEARER OF THE STREAM
Otters are close relatives of the weasel but are less vicious and bloodthirsty. They have been made pets and wild-duck retrievers.

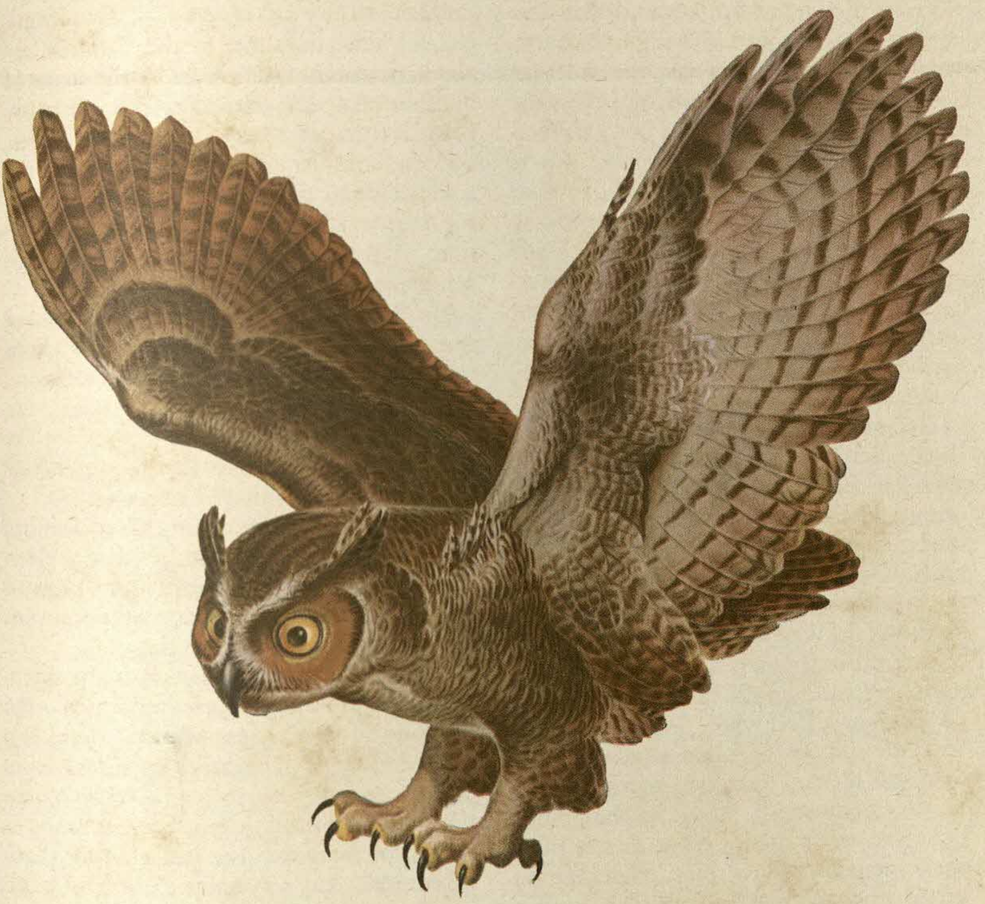
OTTER, *ot' tur.* This playful fisherman, although still occurring in limited numbers throughout its range in the United States, Canada, and Alaska, is seldom seen, owing to its seclusive habits and alertness in avoiding the presence of man. Because of the value of their strong seal-brown pelts, otters have been eagerly sought by trappers from the earliest history of America. They are remarkably adapted to life in the water, their evenly rounded outline of body, short, powerful legs, and webbed feet enabling them to swim with amazing speed and agility. The principal part of their life is spent about streams and lakes, where they make their dens in the banks and feed on fish, waterfowl, muskrats, and other prey which they pursue and capture.

The young, usually numbering from two to five, remain with the parents, by whom they are protected and cared for until well grown. Otters are exceedingly playful and, like the beaver, take great delight in sliding down slippery banks into the water, thus making the well-marked slides found wherever these animals establish their homes.

OUNCE. Derived from the Latin *uncia,* meaning *a twelfth,* the ounce is a unit of weight. In the troy system it equals 480 grains (31.1 grams) or one twelfth of the troy pound; this system is used by druggists and in weighing precious metals. In the avoirdupois system the ounce equals 437.5 grains (28.35 grams) and is the equivalent of one sixteenth of the pound; this is the familiar ounce of everyday life. The fluid ounce, equal to one sixteenth of the liquid pint, contains 1.805 cubic inches or 29.6 cubic centimeters in the United States. See Avoirdupois; Troy Weight.

A GROUND FEEDER
Oven birds find food on the forest floor.

OV'ENBIRD. Known to most countryfolk as the *teacher bird* because of its familiar song, the ovenbird is a ground warbler. When singing, it seems to repeat the word *teacher* with the accent on the last



The Travelers Insurance Company

Sharp Claws Ride On Wings Of Velvet

The owl has especially soft and fine wing feathers. They are so soft that the bird is noiseless in flight. Without warning, it silently swoops down and seizes unsuspecting prey in its sharp and powerful claws.

syllable. Its other name refers to the domed nest it builds, similar to an old-fashioned outdoor oven. The bird is about six inches long, olive green with a dull orange crown, and white underparts streaked with black.

OVID, full name Publius Ovidus Naso (43 B.C.-A.D. 17?). Best known for his *Metamorphoses,* this famous Roman poet was educated at Rome and Athens. After travel in Asia Minor and Sicily, he settled in Rome. There he won many friends, especially at court, but he was banished to Tomi on the Black Sea for his suspected knowledge of court intrigues A.D. 8.

OWL. There are many species of this night-flying bird of prey. The most striking feature of an owl is its eyes, which are large and set to face forward. In order to see, the bird has to turn its head to the side. Each eye is at the center of a circle of feathers, and this seems to add to the eye's size and to give the bird a solemn look. Thus has come the owl's reputation for wisdom, and we often speak of a person as being "wise as an owl." However, the owl is not an unusually wise bird.

The owl has a curved beak nearly hidden by the facial feathers. Some species have two tufts of feathers on the head that look like little horns or ears, although, of course, they are neither. However, the true ear openings are well developed, and the sense of hearing is very keen. The owl's feathers are especially soft and fine, enabling it to fly silently and to surprise its prey. In most species the legs, and in some, even the toes, are feathered. The colors are brown and gray and white, usually without any striking shades, although the markings in the feathers are often very beautiful. Ordinarily, female owls are larger than the males, but they are alike in plumage.

The owl usually hunts by night, and his chief food consists of mice, rats, moles, gophers, and the like, although some species eat insects, earthworms, reptiles, frogs, toads, spiders, fish, and, at times, small birds. Only one North American species, the great horned owl, preys on the poultry yard, and the wise farmer will welcome and protect all other owls as among the most useful creatures on the farm. They usually swallow their food whole or in large pieces, and later spit out the bones, hair, and waste material in the form of matted pellets, which can always be found on the ground below an owl's home. Most species build crude nests in hollow trees; others use deserted nests of crows and hawks; or nest in buildings, on the ground, or in burrows. The eggs number from one to eleven and are always white. The downy young have to be cared for until they can fly.

Owls vary in size from the tiny *elf* owl of Arizona, which is sometimes less than six inches long, to birds more than two feet in length and five feet across spread wings. One of the most common species in North America is the *screech* owl. It is eight inches long and is one of the smallest owls with ear tufts. There are two colors, or phases, one grayish and the other reddish, and both may appear in the same brood.

Other species in North America are the *barred,* or *hoot,* owl, the *long-eared* and *short-eared* owls, the *saw-whet,* or *Acadian,* owl, the *great horned* owl, and the *gray* owl, largest on this continent.

OXALIC, *ok sal' ik,* **ACID.** This strong organic acid is found in the form of *oxalates,* or salts of oxalic acid, in the shape of bundles of needle-shaped crystals in many plants, such as sorrel, pigweed, spinach, and rhubarb. At ordinary temperatures the acid is a white, crystalline substance containing two molecules of water of crystallization. It has an acid taste, but no odor, is soluble in water, and is a violent poison.

Oxalic acid is formed by the action of nitric acid upon many organic substances, particularly the sugars, starch, and cellulose. Commercially, it is made by passing carbon monoxide into caustic soda or by heating sodium formate in the presence of caustic soda or sodium carbonate.

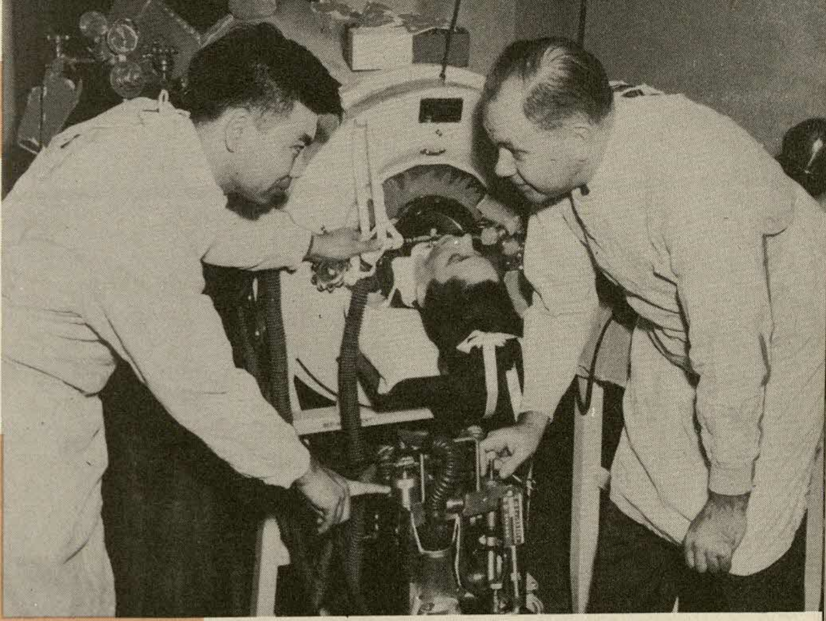
The acid is used in dyeing, as a cleaning and bleaching agent for straw hats, to clean metallic utensils, to remove ink and rust stains, as well as the stains of potassium permanganate, and in tanning.

OXIDATION, *ok si da' shun.* In chemistry, certain elements or compounds often combine in such a manner that there is a flow of electrons (negative particles) from one to the other; such a process is oxidation. The element losing the electrons is said to be oxidized; the one gaining them is reduced. Any substance capable of gaining electrons by chemical combination is an oxidizing agent.

The process of combining oxygen with other elements or with compounds is also oxidation. In fact, until fairly recently, this process was the only one associated with the term. Oxygen combines readily with many other elements, the resulting compounds being known as *oxides.* Monoxides contain but one atom of oxygen in a molecule, dioxides two, trioxides three, and so on.

Rusting, the burning of wood or coal, and the explosion of gas in the cylinder of a gas engine are examples of how oxidation serves man. See OXYGEN.

OXYGEN, *ok' si jen.* Indispensable to life on earth, oxygen is one of the most abundant and most important of all the chemical elements. In the free state it exists to the extent of twenty-one per cent, by



United Press

AUTOMATIC BREATHING

An oxygen inhalator saves the life of a polio victim. This machine supplements the treatment given with the iron lung.

volume, of the atmosphere. Its compounds are very abundant in nature. By weight, eight ninths of water is oxygen, as is a high percentage (by weight) of sand, alumina, and chalk, which are widely and very abundantly distributed as constituents of the crust of the earth. Nearly every mineral and rock, as well as all animal and plant compounds, contain combined oxygen. In short, oxygen is so plentiful that we find it free or combined to a large extent in the air we breathe, the water we drink, the things on which we walk, the food we eat, the clothes we wear, and in the flesh, bone, and fluids of which our bodies are composed.

In the process of respiration, carried on by all living things, oxygen is consumed. Plants also evolve it during the process of photosynthesis (building up carbohydrates). Energy, in the forms of heat, light, and electricity and mechanical energy, is generally directly or indirectly dependent upon a reaction with oxygen.

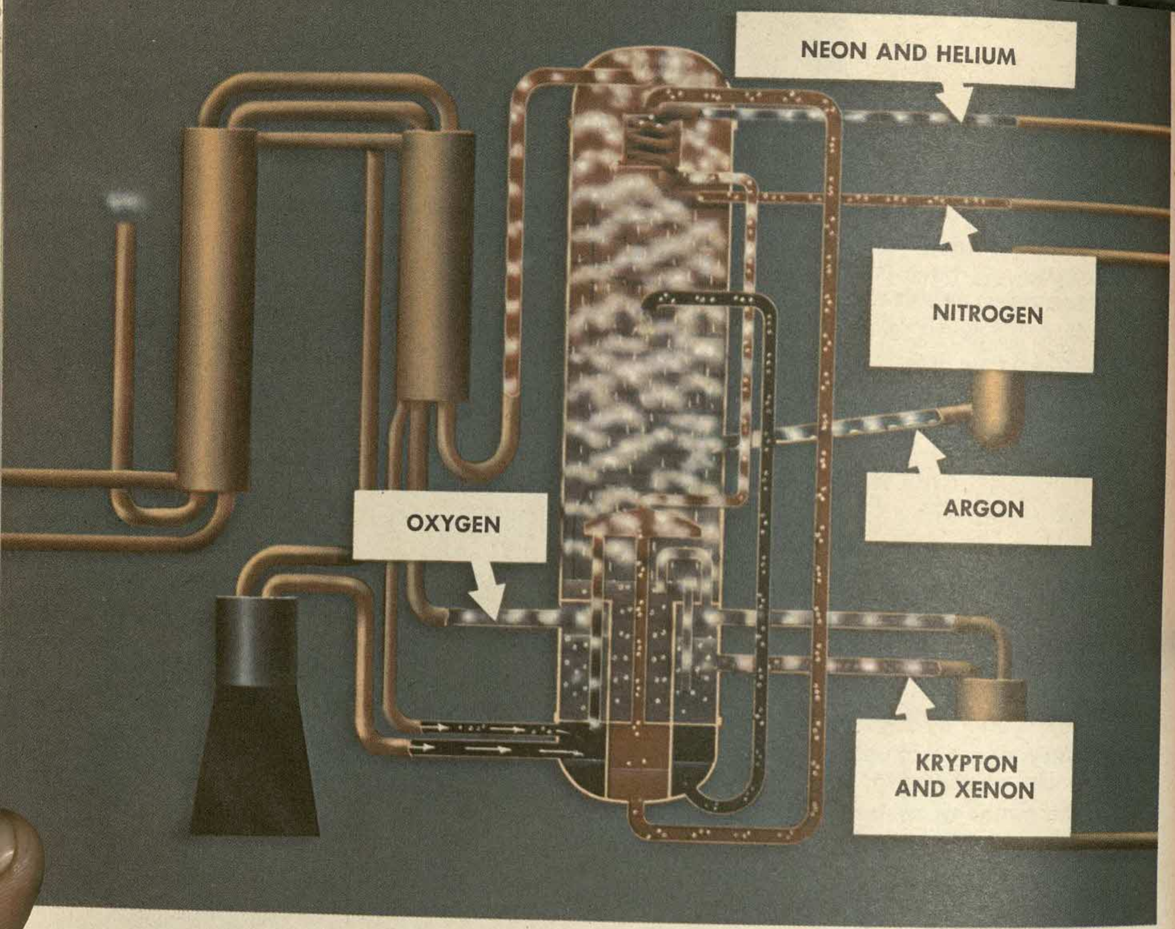
Oxygen can be prepared from many of its compounds, such as oxides and chlorates, but the commercial preparation chiefly used results from liquefying air and separating the oxygen from the nitrogen by fractional distillation. This process readily produces oxygen that is about ninety-nine per cent pure. Water will yield it by electrolysis.

Oxygen is a colorless, odorless, tasteless gas, slightly heavier than air. It can be liquefied at 118° C. below zero. Oxygen is soluble in water to the extent of three parts to 100 parts by volume. It is dissolved oxygen that fish and water plants use in their respiration process.

Oxygen is an extremely active element and combines with a great many other substances. Union with oxygen is called *oxidation,* and the products of oxidation are usually called *oxides.* The ability of oxygen to unite with most elements, and thus with many compounds (especially plant and animal compounds), and in so doing to produce waste products and useful energy, is the most characteristic property of oxygen.

Without oxygen there would be no plant or animal life; no production of heat, light, and power from coal, wood, or gas; no disposal of sewage and decay of dead vegetable and animal matter, but a dead world of unsightly and lifeless things. Oxygen is used in medicine to aid faulty respiration; in submarines, tunneling work, and high-ascending airplanes, to replenish the oxygen of the air; and in the producing of very hot flames by the oxy-hydrogen or oxyacetylene flame. Its symbol is *O.*

For additional information, consult the



Courtesy of Air Reduction Sales Company

FROM THE BREATH OF LIFE

Of the many gases that are combined to make up our atmosphere, oxygen is among the most important. It is commercially extracted from liquefied air, above, along with nitrogen and some of the rare gases. Besides its importance in the air we breathe, it is used in medicine to restore or aid breathing and in treatment of various diseases. It is used in industry for hot welding flames, to promote fuel combustion, and in explosives and rocket propellants.

following articles:

- Acetylene
- Atmosphere
- Breathing
- Distillation
- Electrolysis
- Liquid Air
- Oxidation
- Ozone

OYSTER. A soft-bodied, hard-shelled mollusk, the oyster is a valuable small salt-water animal, highly prized as a food. The two-piece shell in which it lives is bound together by a strong muscle and closes tightly when danger approaches. The mouth, located at the small end of the body, is joined to its stomach by a small tube. The animal cannot move about because early in life it attaches itself permanently to some underwater object. Its food is wafted to it by ocean currents.

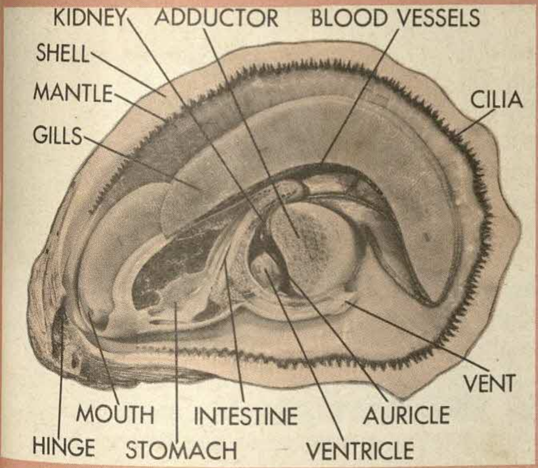
Oysters multiply by eggs, so small that they appear as a milky mass in the water. The young move about at first but then make their attachment. They usually are found in temperate ocean waters that are shallow and gravel-bottomed.

Most commercial oysters are raised on oyster farms, or beds, stocked with young, or "seed," oysters. These mature in about three years and are harvested by being scooped up with heavy tongs or with dredges. They are then "shucked" (shelled), frozen, canned, or shipped in the shell.

UNDERWATER DEFENSE

The ordinary oyster relies on its shell to protect its soft body from enemies. The thorny oyster, though, has some fish enemies that can easily crush its shell. For added protection, its shell bristles with long spines that curve outward in a menacing fashion.

The Travelers Insurance Company



NO WAIST OR WASTE

No part of the oyster extends outside of its shell. It has no head, neck, legs, or torso that we usually expect to find on animals. All of its organs are used to maintain its life. Water, agitated by the cilia, flows across the gills to provide oxygen for breathing, and flows into the mouth to provide food. The soft sections are the parts that are prized as a sea food. The mother-of-pearl lining of the shell is used to make ornaments, and ground up shells are used as grit in poultry and cattle feeds.

Oysters are also the source of pearls, formed when the oyster covers a grain of sand inside its shell with many layers of mother-of-pearl. Oyster shells are used for ornamentation and are ground as grit in poultry feeds.

OYSTER CATCHER. The sharp wedge-shaped bill with which this wading bird opens shells gives it its name. The bird, about the size of a crow, is found along the seacoasts. It has long legs and is black and white in color.

OYSTER PLANT, or **SALSIFY.** This plant has a long tapering root that tastes like an oyster. The roots are usually allowed to winter in the ground for better flavor.

OZARK MOUNTAINS. Among the oldest mountains in North America, these were once lofty ranges. Today the greatest height is scarcely 2,000 feet. Located in southern Missouri and northern Arkansas, the mountains are sources of coal, zinc, lead, and iron, and contain many resorts for camping, hunting, and fishing.

OZONE. This form of oxygen, created by electrical discharges through the air, is partly responsible for the stimulating feeling of air after an electrical storm. It is damaging to rubber articles but is useful as a sterilant and a bleach.

P. It is difficult to recognize today the letter *P*, sixteenth in our alphabet, as the symbol of the lower lip of a man. But such it was in the Phoenician alphabet, when it was written 𐤐. When the Greeks adopted the letter, they at first wrote it ℸ, and they wrote it from right to left. Later, when they wrote from left to right, the letter looked like this, Γ The Romans closed the letter and wrote it *P*, as we do today.

PACIFIC, *pa sif' ik,* **OCEAN.** When Balboa climbed to the heights of Darien in Panama in 1513 and gazed over the sparkling, sunlit Pacific, he little realized the great significance of his discovery. But seven years later, when Magellan and his valiant crew crossed this mighty expanse in their tiny craft, the world learned for the first time its vast extent. Because he found the ocean peaceful after his perilous trip through the strait which now bears his name, Magellan called it the Pacific.

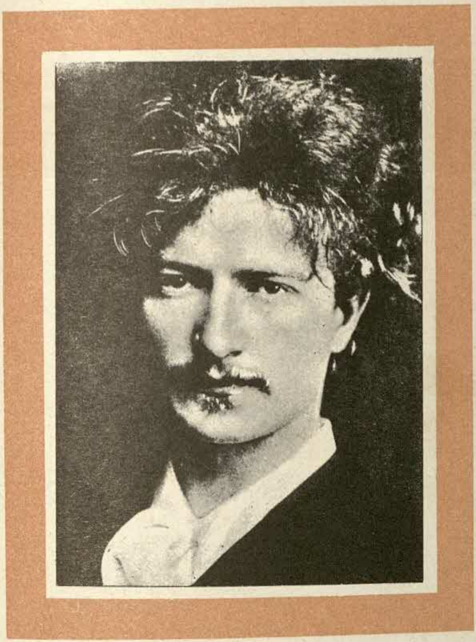
With an area of more than 69,000,000 square miles, the Pacific covers more than twice the combined area of the four continents whose shores it washes. Its greatest width from east to west is 11,000 miles; from north to south it stretches nearly 10,000 miles. So deep is one point in the ocean (35,800 feet in the Mariana Trench off Guam) that Mt. Everest could be dropped into it and more than a mile of water would cover the peak. In January, 1960, the bathyscaphe *Trieste,* probing the depths of the Pacific, made a record dive to the bottom of this trench.

The currents of this vast body of water are similar in nature to those of the Atlantic and have a great effect on several countries. The famous Japan Current sweeps across the northern area of the ocean and bathes the shores of Alaska, Western Canada, and the northwestern coast of the United States. Throughout this shore-line area, temperatures are kept mild by the warm breezes from this current; in the upper latitudes, fog prevails almost constantly, caused by the meeting of warm and cold air currents.

Few good harbors are found on the western coast of North America, largely because of the gradual rising of the shore. Several smaller bodies of water, including the China Sea, Sea of Japan, Yellow Sea and Sea of Okhotsk, deeply indent the Asiatic coast, creating a number of fine harbors.

The Pacific Basin. The gigantic basin of the Pacific is not a smooth bowl. Its floor supports lofty mountains and is slashed by deep canyons. Most of the mountains are covered with water, sometimes to a depth of several miles, but in places they jut above the surface. The Hawaiian Islands and the Philippines are the tops of Pacific mountains. Mauna Kea, in the Hawaiian Islands, stands 30,784 feet above the floor of the ocean, more than a thousand feet taller than Mount Everest. The mountains are of volcanic origin, and volcanic activity continues under the ocean.

There is a theory that the Pacific basin is the birthplace of the moon. Ages ago, the plastic surface of the earth rose and fell with the tidal pull of the sun. Eventually the liquid interior of the earth began to oscillate in time with the tides, pushing as they pulled. Thus, increasing through centuries, the tidal momentum finally became so great that a huge mass of earth was hurled into space. One piece of evidence offered in support of this theory is that the Pacific is floored with basaltic rock, which in the other oceans is covered with a miles-deep layer of granitic rock. See OCEAN; TIDES.



ARTIST AND STATESMAN
With the same intensity that he brought to his virtuosity at the piano, Paderewski threw himself into work for his country.

PADEREWSKI, *pah de ref′ ski,* IGNACE JAN (1860-1941). A world-famous artist who became a patriotic statesman, Ignace Jan Paderewski is ranked among the greatest pianists of all time. He was born in a small Polish town when Poland was part of Russia. He began his musical career at Warsaw, later studying in Berlin and Vienna. Paderewski made his formal debut as a concert pianist in Vienna in 1887. Then began a series of triumphant tours in Europe and America, during which the artist was given enthusiastic ovations. Paderewski wrote a number of compositions for the piano, and his *Minuet Antique* is a favorite of piano students.

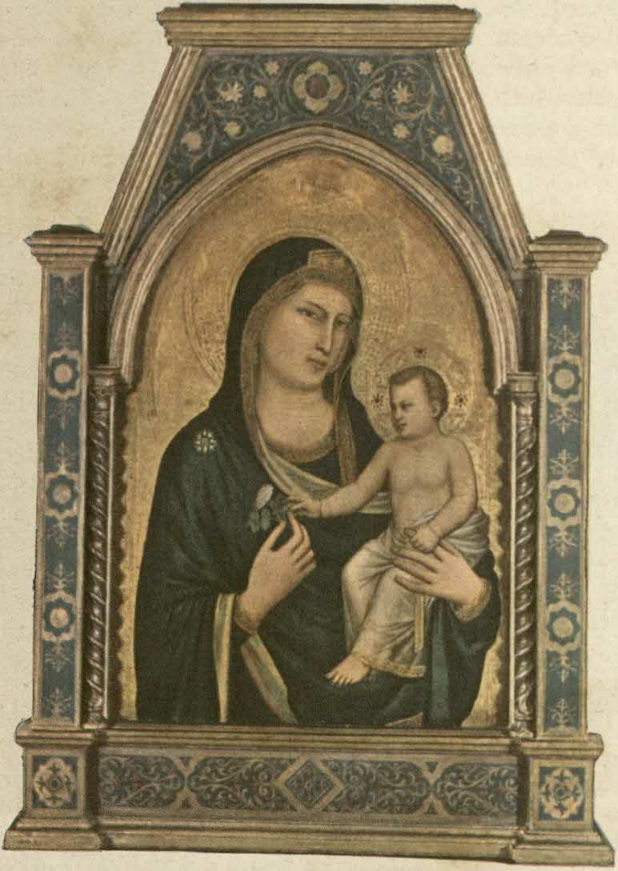
At the close of the First World War, Paderewski became Premier and Foreign Minister of the new Polish Republic and helped to lead his country on the path to recovery. In 1940, he was elected President of the Polish National Council, in exile in France. But he was too ill to attend its sessions; he sailed for New York, where he died the next year. See POLAND.

PAINT. Beauty and protection are the contributions of paint, a coloring substance which can be spread or sprayed on a surface. Paint consists of a pigment, which forms the color layer, and a vehicle, which may be water or oil, by which the pigment may be manipulated. When the so-called water colors are used, the water dries and leaves the pigment on the surface. In oil colors, a drying oil is used, which hardens by absorbing oxygen from the air and holds the particles of the pigment together, forming a tough, elastic layer. Linseed oil is recognized as the best of the oils for this purpose, although tung, hempseed, and soybean oils are also used.

The pigments are usually in a dry powder or paste form before being mixed with the vehicle. They are obtained chiefly from minerals, and are ordinarily compounds of metals, such as the oxides, carbonates, and chromates. For the painting of exterior surfaces, a paint composed primarily of linseed oil and white lead or red lead, as a pigment, is a standard paint. White lead is easily tinted with colored pigments.

Water paints, or emulsion paints, are often used for interior painting. In place of oil, they are made with water and a binder such as casein, or rubber or a synthetic resin and an emulsifying agent. Some contain a vegetable-oil additive which makes them jellylike and dripless. Various phosphorescent substances may be added to paints to make them luminous. Other substances may be added to them to make them resistant to fire, molds, or barnacles.

PAINTING AS A



"Madonna and Child" by Giotto di Bondone (1276?-1337?) illustrates the first attempts by Western artists to break away from the ornate, artificial art of the East. The serene expression on the Madonna's face and the soft flowing drapery of her robe show how pre-Renaissance artists led the way for the painters of the next century. National Gallery of Art, Samuel H. Kress Collection.

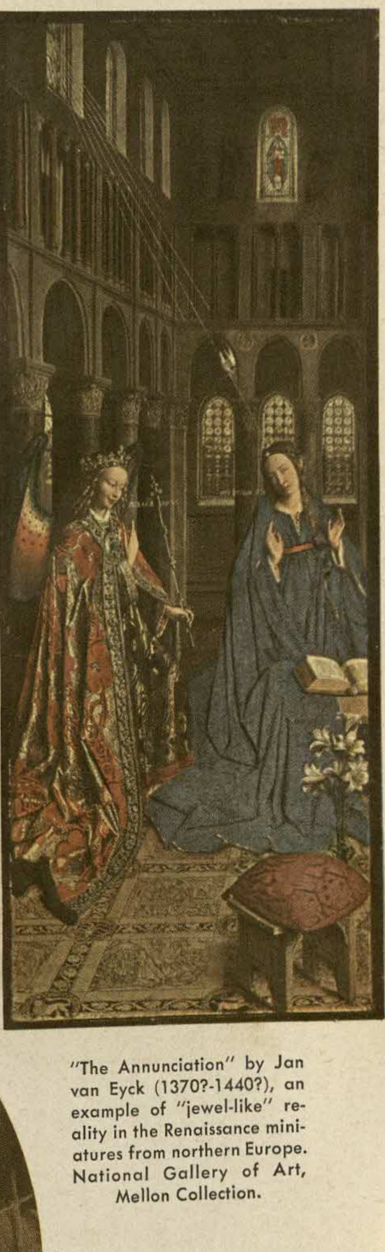
PAINTING. Although not all of us paint, we are at all times concerned with the same things that concern painters. To use our environment, we have to make judgments as to the meaning of shapes, sizes, spaces, color, and many other visual distinctions. These are among the primary concerns of the painter. The difference is that we would be more concerned with trying to decide whether a dark shape is a shadow or a door we might use, while the painter is concerned with trying to decide what kind of shape and darkness would best represent an open door in his painting. We, as the painter must be, are concerned with what is important to be seen. When we are driving an automobile, the way the road turns and the conditions of traffic are the important things to be seen, and when we permit ourselves to become visually involved with other things, we run into trouble!

Because of the tremendous range of our activities today, we receive many different visual impressions that painters consider important.

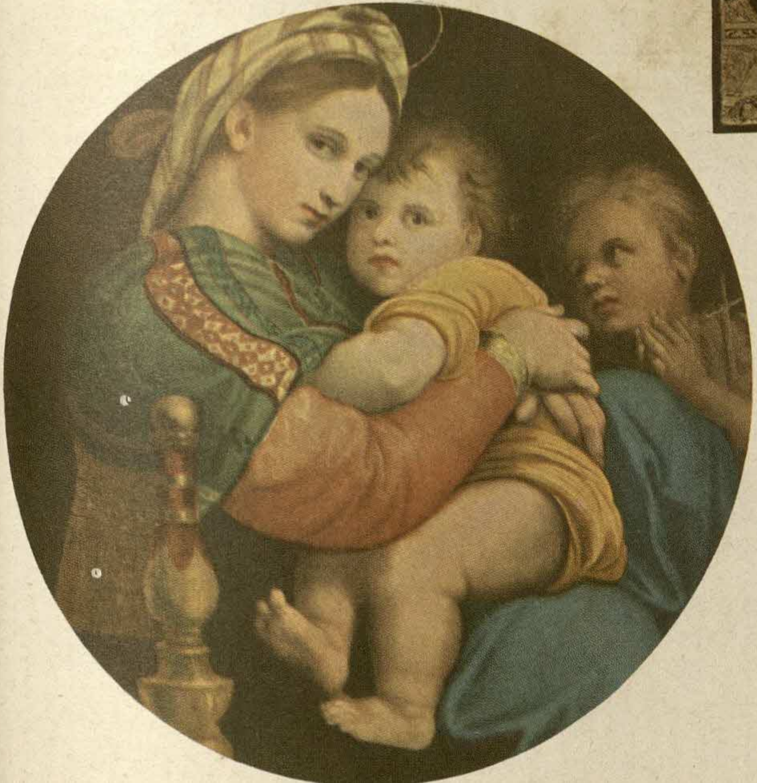
Art as a Product of Society. Many of us are concerned with what we are as

RECORD OF MAN'S KNOWLEDGE and ASPIRATIONS

Artists were eager for a fresh outlook with the coming of the Renaissance. They discarded the stiff formality of the Byzantine period, with its emphasis on extravagant ornamentation. The masters of the Renaissance concentrated on true proportion of parts and purity of outline. This realistic approach was in keeping with the times, when men all over Europe were making exciting new discoveries in science, languages, philosophy, and government. The change from Byzantine to the Renaissance style of painting was tremendous, yet it took only about 150 years.



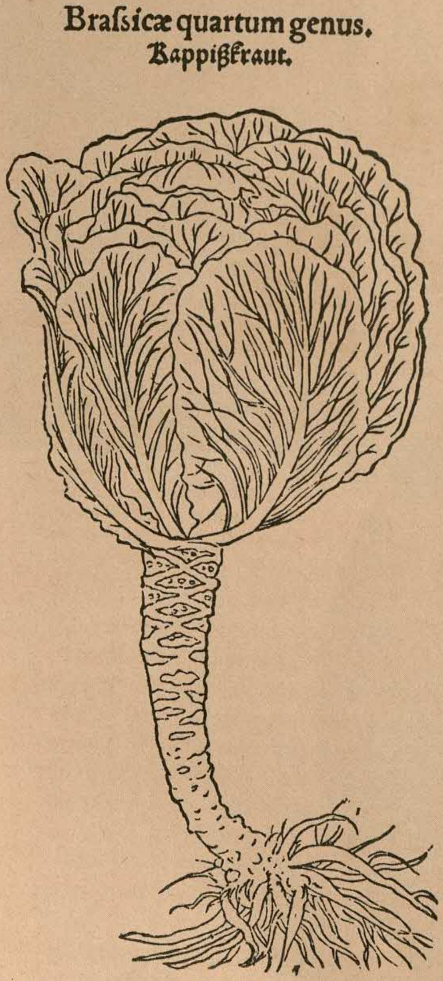
"The Annunciation" by Jan van Eyck (1370?-1440?), an example of "jewel-like" reality in the Renaissance miniatures from northern Europe. National Gallery of Art, Mellon Collection.



The tender simplicity of "Madonna of the Chair" by Raphael (1483-1520) highlights the naturalism of the Italian Renaissance.

individuals and how we relate to other people in a changing society. The studies of anthropology, sociology, and psychology help us to understand these aspects of our lives. As a result we, and painters, are involved with visual forms that we did not recognize as a society a hundred years ago. Many painters identify themselves today in a manner that reflects their new understanding; they call themselves *abstract expressionists.*

"Kappiskraut," a cabbage plant woodcut from a sixteenth century text, shows that painters of that time had already perfected the use of art to present reality as we think of it.



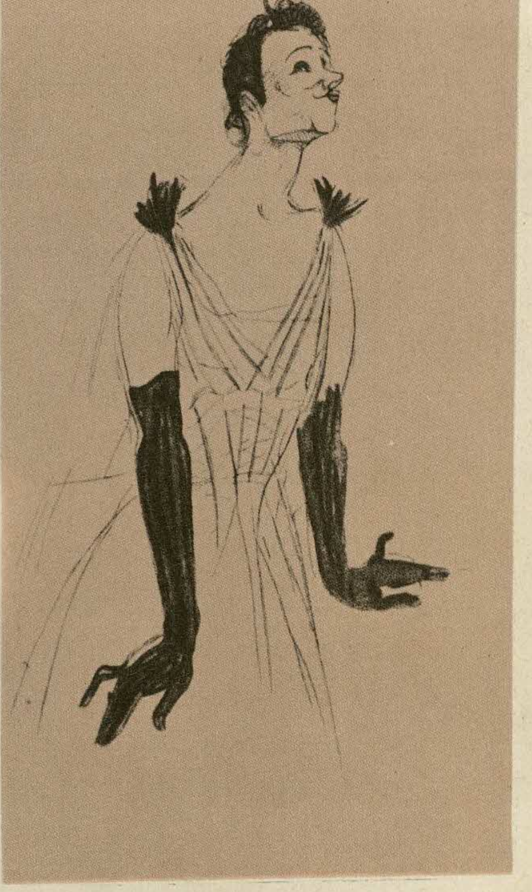
But no matter what we call painters or what they call themselves, they have always concerned themselves with human affairs and this is what makes them artists. For human affairs have been, and still are, matters of value judgments that cannot as yet be arrived at scientifically. This is why we so often say today that art is a reflection of society and the times; for society and the times shape and modify the judgment of their men and their artists.

The conclusion that art is a product of society is a valuable key to understanding why painters have made paintings in various styles. The history of painting styles in our western civilization can be considered a study of this relationship, similar to the history of any of the other cultural developments of man.

Early Christian Painting was essentially "primitive," the product of self-taught artists. Unlike the Roman and Hellenistic societies, the civilization of the early Renaissance had vast collections of slaves to produce materials and goods, so as to give time and opportunity to a few to develop skills and knowledge to great technical heights. The paintings and drawings of this period were usually the product of artisans working at the more profitable trades, such as metal workers, stone masons, or carpenters. Their need in these occupations for planning and visualizing led them to develop painters' skills.

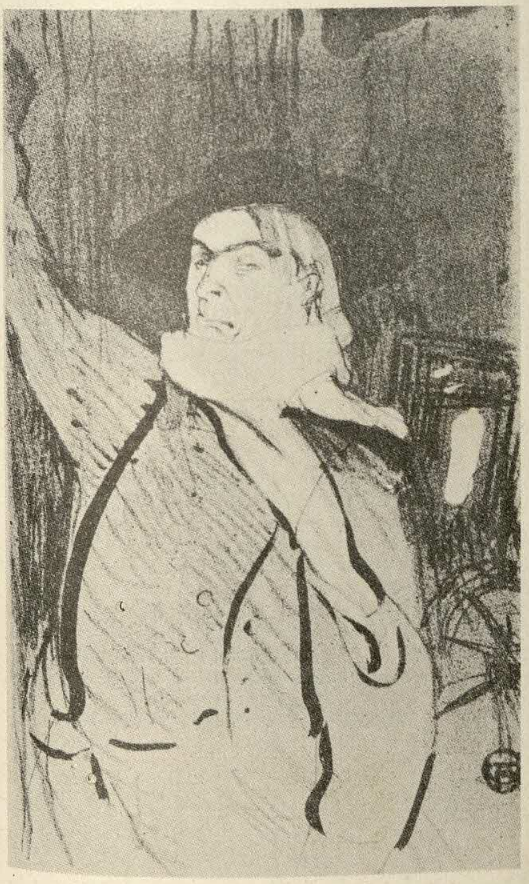
These skills represented only a limited knowledge of the way humans saw the things they did see. It was not until the fifteenth century, with the work of Leon Battista Alberti (1404-1472) and Leonardo da Vinci (1452-1519), that this knowledge was stated. Before that time there was no demand for realism or "plastic" presentation; the subject content of painting was mostly symbolic. The people depicted in the early paintings were less to be thought of as people than as symbols representing people. The beauty of the work was in careful artisanship and the formal organization or placement of the parts of the painting—gold leaf, actual gem stones, and precious pigments were used to enrich these paintings. Lapis lazuli, a gold-flecked blue stone, was often ordered for the blue of the Virgin's robe to achieve a stable color that would not deteriorate as would some copper compounds used at the time. The value of the piece of art could at times be measured by the materials that went into it. "The Annunciation" by Simone Martini (1283?-1344), now in the Uffizi Gallery (Florence, Italy), is an example of such work.

Giotto di Bondone (1276?-1337?), Italian painter, sculptor, and architect, was the first artist to reflect the growing economic wealth and intellectual development of the Renaissance. In his work we see the developing form of western painting. His most important paintings were primarily in *fresco,* a new medium of his time that uses the alkaline nature of plaster to hold and produce colors. Even though Giotto still was concerned with placement of shapes and use of color, his figures were modeled and posed with realism.

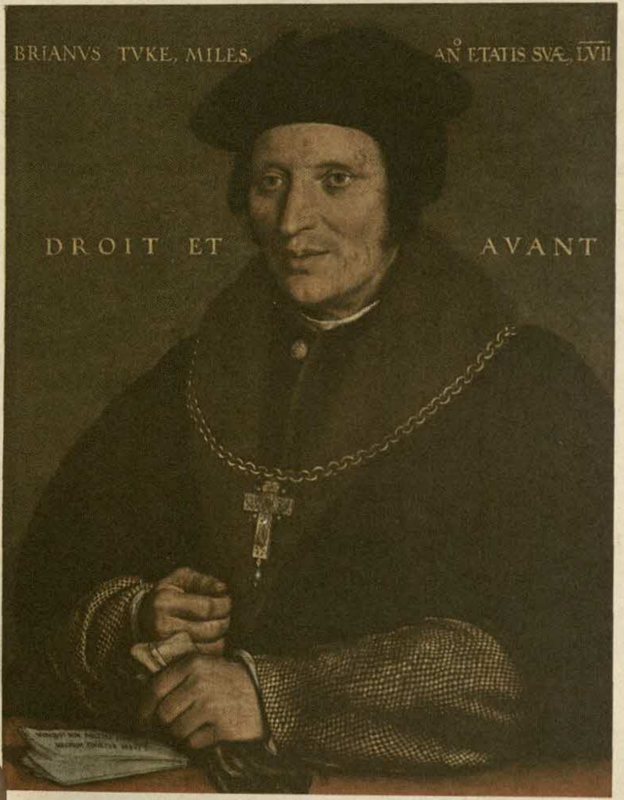


Caricatures of notable personages capture public attention but do not always have the approval of the subject. They usually stress the outstanding features of the person being painted, with a certain amount of exaggeration and cleverness. Singer Yvette Guilbert called Toulouse-Lautrec "a little monster" and the drawing "horrible" when she saw this caricature of her attitude on the stage. Toulouse-Lautrec and illustrator Honoré Daumier (1808-1879) contributed much to the establishment of caricature as a popular art form.

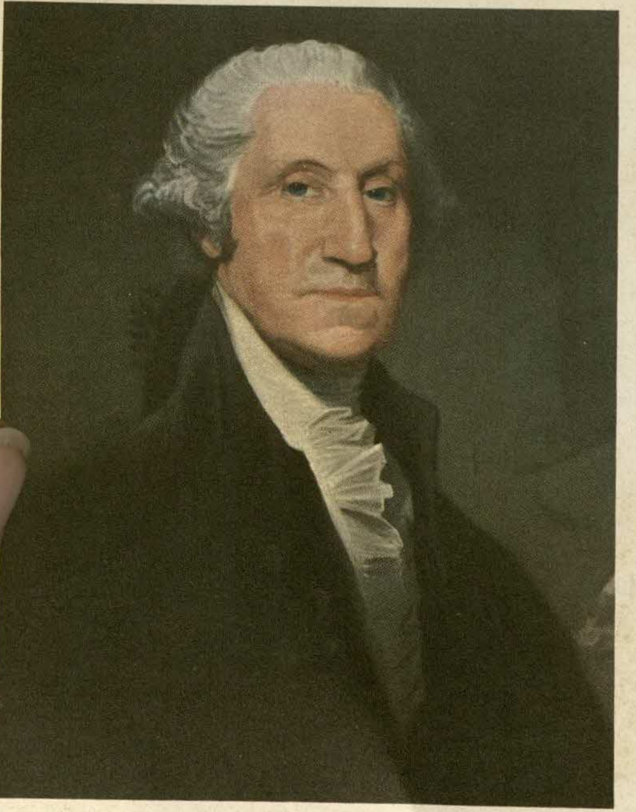
Many of the great painters of yesterday would be the commercial artists of today, concerned with the economic aspects of art. They devoted their works to posters and art illustrations. Among them was the famous Toulouse-Lautrec, whose poster "Le Chansonnier," below, pictured Aristide Bruant, a popular singer of the times.



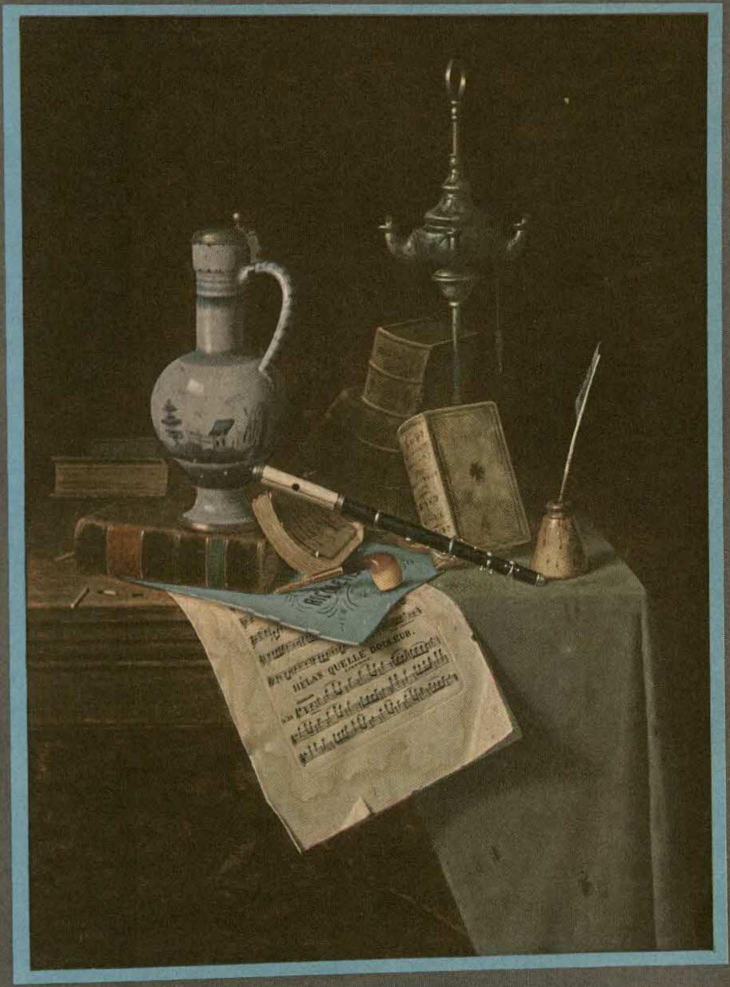
In some respects the hundred and fifty



Though artists chose different subjects and the painting styles did change and grow, the resulting differences were slight from the fourteenth to the nineteenth centuries. The printing press, faster communications, and economic interdependency all worked to keep painting concerns similar. The portrait of Sir Brian Tuke, left, by Hans Holbein the Younger (1497?-1543), presents reality in much the same way as the paintings of portrait artists of almost three centuries later. National Gallery of Art, Mellon Collection.



The portrait of George Washington, left, painted by Gilbert Stuart (1755-1828) in the nineteenth century, presents much the same realism as Holbein's portrait. It also serves as a reminder that painters had to rely on commissions from the growing middle class of merchants and farmers when they had no aristocracy or church to provide their financial support. Some also became associated with the growing printing and publishing businesses of their times.



Two conflicting approaches to art were common during the nineteenth century. Artists who preferred realism polished and perfected their craft until it was brought to such a high level as "My Gems," right, by William Hartnett (1848-1892). Such a detailed painting is usually a "still life" because of the exacting study necessary to achieve its precisely realistic quality. In contrast to realistic paintings, the enthusiastic approach of the impressionists created new styles almost daily. National Gallery of Art, Avalon Foundation.

years after Giotto's death must have been as exciting for its participants as the past hundred and fifty years have been. The increasing awareness by man of his physical and economic potential was recorded by the painter. In a short time the simple craftsman's labored painting was replaced by an ease of presentation flowing from opportunities for study and research. These new artists had teachers. There was an economic demand great enough to sustain them through painting alone.

The Flowering of the Renaissance. By the end of the fifteenth century, the Renaissance had made Europe an economic whole, and men of knowledge and skill could move about the continent. As they followed their pursuit of knowledge, they created the need for more. The invention of the printing press to answer this need served another purpose. It provided the means for graphic presentation of our plastic or "real" world, and helped stabilize the existing style of painting, with the exception of minor style changes, for the next four centuries. The problems involved in illustrating the specimens described in the *Herbals and Mechanic's manuals* helped to develop the engraving arts. The painter played a role by refining his paintings to drawings that could be engraved. Almost all of the great artists of the fifteenth, sixteenth, seventeenth, and eighteenth centuries, including Pieter Bruegel, known as PIETER THE ELDER (1520?-1569); Albrecht Dürer (1471-1528); Rembrandt van Rijn (1606-1669); Andrea Mantegna (1431-1506); Sir Anthony Vandyke (1599-1641); and Hans Holbein, known as HANS THE YOUNGER (1497?-1543) contributed to the development of printing and publishing and allied industries in the regions in which they resided while carrying on their painting.

The printing press not only spread identical word descriptions of knowledge; it also spread identical images of the world helping to make Western society as consistent as it could in the face of disrupting influences.

What perhaps needs emphasis is that the painter usually has been a contributor to the economic and intellectual wealth of his particular society. Though we may identify some artists as "great," that does not separate them or their ideas from us. It means that their greatness comes from their contribution to our better understanding of what we are, what we know, and what we can do.

The charcoal drawing, above, made by Edgar Degas in the 1890's, demonstrates the growing interest of the times in finding new ways to present common subject material. The variations of Degas often appear in his sensitive treatment of details.

Paul Cézanne's pencil drawing, below, reflects the artist's effort to find the "essentials" of his subject in the simplification of naturalism. Cézanne is said to have stated that all realism is actually a variation of the cube, the cone, and the sphere. His efforts contributed to the style known as cubism, developed in the 1890's and still popular, especially in Europe.

The Beginnings of Modern Art. The concern for visual reality began with the Renaissance and the painter continued it up to the development of the camera, which helped to open a new era. The camera was the product of an effort to gain a more accurate and adequate visual image, and also was the product of a new age of technical developments.

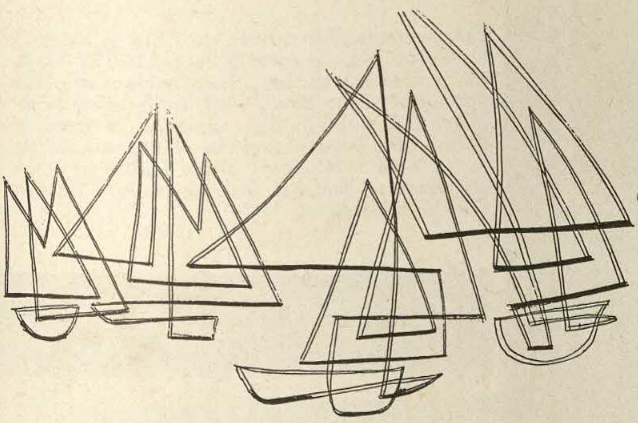
In 1839, the year of the invention of a successful camera, Michel Chevreul, French philosopher-scientist, published his "Scientific Theory of Coloring." This groundbreaking work was the beginning of today's mounting knowledge of what, how, and why man sees what he does.

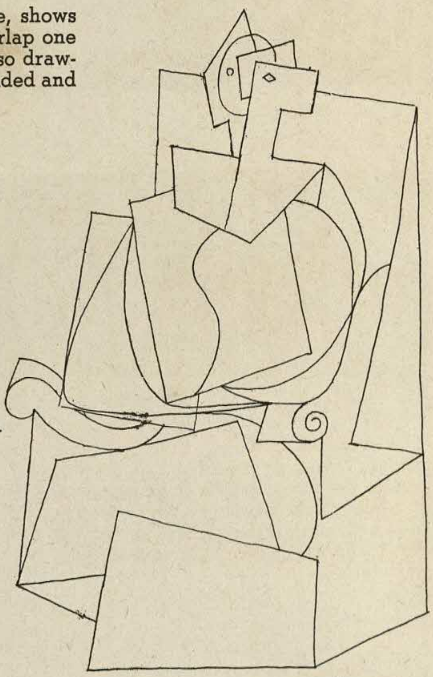
The impressionists, who held their first exhibit in the gallery of Nadar, real name FELIX TOURNACHON (1820-1910), great French photographer, in 1874, presented the world in color forms that man experienced. Virtually every new breakthrough in man's understanding of himself since that time has been reflected by new concerns in painting.

Cubism developed shortly after impressionism. Its more famous exponents, Georges Braque (1882-) and Pablo Picasso (1881-), provide all varieties of solutions to contemporary illustration problems, especially television cartoons, and industrial design. Cubism is the product of the same type of intellectual concern that led Sigmund Freud to attempt to find out what lies at the root of human behavior; cubists were attempting to present a truer reality in terms of our sense of geometrical space.

The Contemporary Artists. Expressionism is a product more of the twentieth century than the nineteenth. It demonstrates the painter's concern with his own private view of the world, supported by the psychological theory that we all see different things. Surrealism, which stems from similar psychological concerns, already has waned. It was a product based upon the interpretation of dreams. Salvador Dali (1904-) has been the most popular surrealist painter.

"Sailboats Rocking," below, a 1927 pen drawing by Paul Klee, shows how a group of things may appear as a unit when they all overlap one another. "Woman In An Armchair," right, a 1918 Pablo Picasso drawing, depicts the world as flat planes, much like sheets of paper folded and overlapping. This idea continues in use today in some cartoons and illustrations.

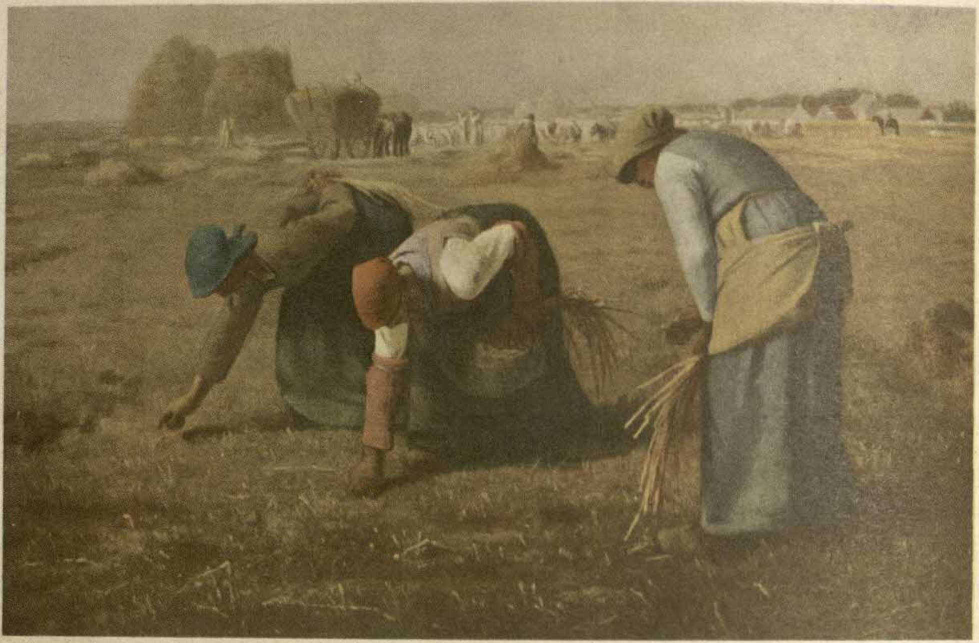


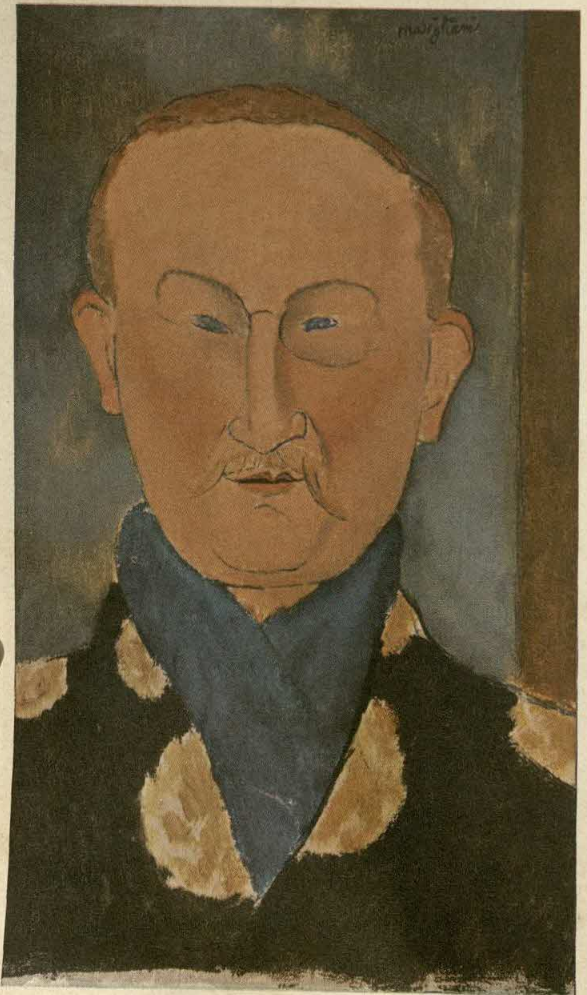


Today's Artists. One of the greatly admired modern artists is Paul Klee (1879-1940), whose seemingly simple "doodles" reflect psychology's concern with perception. Things that might strike us as unreal in our traditional social experience and art forms appear in Klee's work in accordance with the latest knowledge of basic visual perception. Klee and many other modern artists carry the Western concern for "reality" beyond naturalistic paintings, such as are used to illustrate these very books.

Consult also the following titles:

Angelico, Fra
Bellini, Giovanni
Bonheur, Marie Rosa
Botticelli, Sandro
Camera
Color
Corot, Jean B. C.
Drawing
Dürer, Albrecht
Engraving
Eyck, Hubert Van and
  Jan Van
Eye
Gainsborough, Thomas
Giorgione
Giotto
Hals, Frans
Hobbema, Meindert
Holbein, Hans (Elder
  and Younger)
Inness, George
La Farge, John



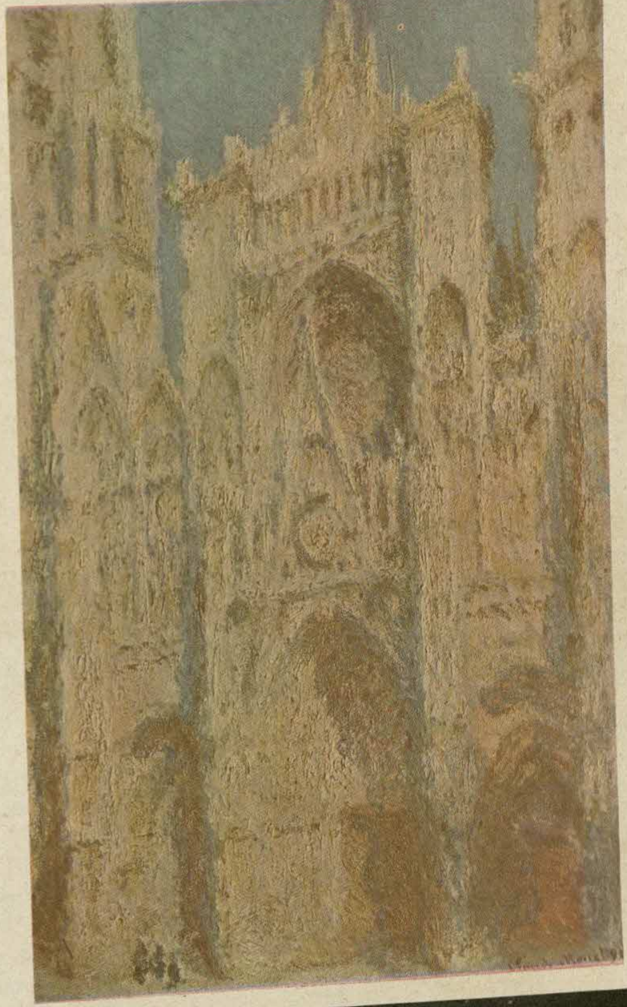


The photographic realism of "The Gleaners," above, by Jean François Millet (1814-1875) is in sharp contrast with the brilliant modernism of the portrait of "Léon Bakst," left, by Amedeo Modigliani (1884-1920). The explosion of painting styles in the latter part of the 1800's was similar to the rapid development at the beginning of the Renaissance. National Gallery of Art, Chester Dale Collection.

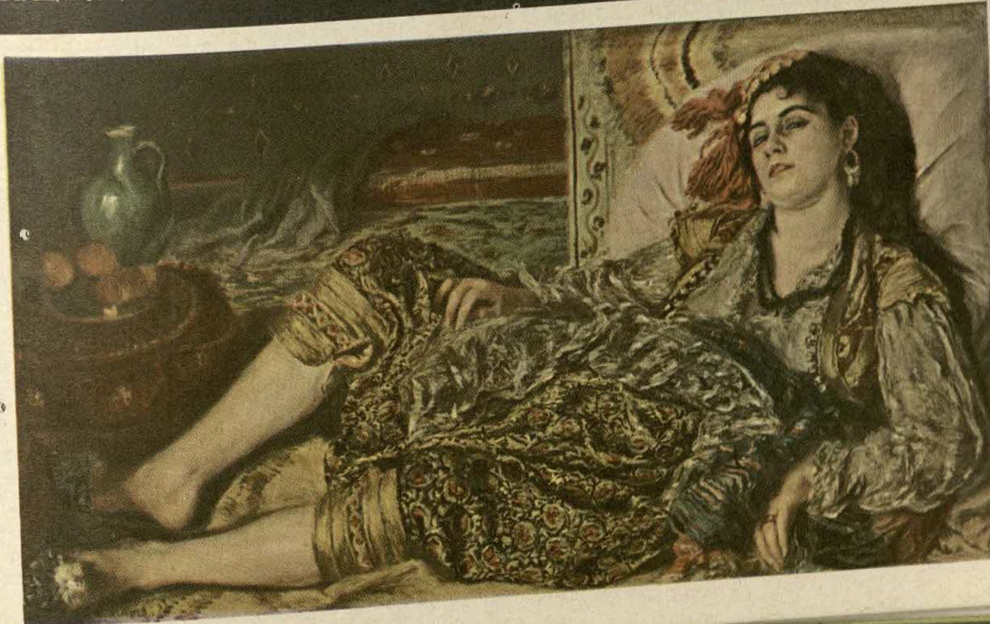
A NEW AGE IS

Landseer, Edwin H.
Light
Memling, Hans
Michelangelo Buonarroti
Millet, Jean François
Monet, Claude
Murillo, Bartolomé Estéban
Peale, Charles Willson
Photography
Printing
Raphael Santi
Rembrandt
Renaissance
Reynolds, Joshua
Rossetti, Gabriel Charles Dante
Rubens, Peter Paul
Ruysdael, Jacob Van
Sargent, John Singer
Stuart, Gilbert
Tintoretto
Titian
Turner, Joseph M. W.
Vandyke, Anthony
Velazquez, Don Diego
Vinci, Leonardo da
Watteau, Jean Antoine
West, Benjamin
Whistler, James A. McN.

Two paintings show two widely different ways to present a subject, although both were done by painters of the impressionist school. Claude Monet (1840-1926) was interested mainly in presenting color as we sense it. Although the contents of his paintings may be vague, there is almost a physical feeling of color in them, as shown in his "Rouen Cathedral," right, with its appearance of dazzling sunlight. "Odalisque," below, by Pierre Auguste Renoir (1841-1919) has a far different tone, with its impression of the richness of color. Both men worked as they did because of new findings in their time in the field of psychology. The first studies of how we see were concerned with color, and painters used this new knowledge to give their "impressions" of objects. Up to this time, color had been used primarily to show only lightness and darkness. Now it became a part of the subject matter. National Gallery of Art, Chester Dale Collection.



USHERED IN BY NEW VISIONS



PAKISTAN′, Republic of. This large state in southern Asia, with an area of 364,737 square miles, is separated into two parts by 1,000 miles of territory belonging to India.

West Pakistan on the Arabian Sea contains the capital Islamabad, as well as the large cities of Karachi, 1,127,000, and Lahore, 850,000. East Pakistan borders on the Bay of Bengal and is enclosed by India and Burma. Its rich farming country, where rice and jute are grown, is very much overpopulated. Dacca, a city of 411,000, is in East Pakistan. Pakistan has a total population of about 86,000,000. About 88 per cent of the people are Moslems.

Pakistan was formed as a nation in the British Commonwealth in 1947 from the parts of India where most Moslems lived. It became a republic in 1955.

PAL′ATE, the part of the mouth usually called the "roof." It is divided into the hard and soft palates and separates the mouth from the throat and nasal passages. With the tip of your tongue, you can feel the hard, bony front part. When you look at your mouth in a mirror, you can see a soft fold of membrane lining the roof of the mouth where your throat begins. Part of this membrane hangs down from the roof. This is the *uvula*, a part of the soft palate. It is important in making certain sounds and in swallowing, because its numerous glands secrete mucus that lubricates the throat. When the uvula becomes relaxed or enlarged, it "tickles" the throat and causes a cough. See Tonsils.

PALEONTOLOGY, *pay le on tol′ oh jih*, a study of prehistoric plants and animals by an examination of their fossilized remains. These fossils consist of the mineralized bones and hard portions of plants and animals which have been preserved in rocks. Paleontological studies are comparative; that is, earlier forms are compared in structure with later forms to discover how the organism has developed. The science is closely related to geology and biology. See Fossil; Geology.

PALESTINE, or THE HOLY LAND. The cradle of three great religions, Islam, Hebrew, and Christianity, Palestine is a tiny region on the eastern shores of the Mediterranean. In 1948, the new nation of Israel was created here, a modern Jewish state in the old Jewish homeland. Other parts of Palestine, which had been a British mandate, were taken over by the Arab states of Jordan and Egypt. See Israel.

The country is divided roughly in two by a chain of lakes and rivers extending from north to south, which includes the Waters of Merom, the Sea of Galilee, the Jordan River, and the Dead Sea. To the west this long, narrow valley rises to a range of mountains which gives way to a narrow, fertile plain along the Mediterranean. East of the Jordan are steep mountains and a desert. The climate ranges from temperate to subtropical. There is abundant rainfall in the western section from October to April, but the rest of the year is hot and dry. Irrigation is necessary for most of the land.

Ancient Palestine was known as Canaan and Philistia. In the eleventh century B.C. the Hebrew king Saul united it into a single kingdom. David and Solomon succeeded to the throne, but the nation broke up into two kingdoms in the tenth century B.C., Israel in the north and Judah in the south. Israel fell to the Babylonians in 586 B.C., and Judah to the Assyrians in 722 B.C. At the beginning of the Christian Era, Palestine was divided into four provinces under Roman rule, and passed under Mohammedan rule in the seventh century. The Turks succeeded to the area in 1516, and held it until the British conquered it in 1917-18.

Great Britain governed under a mandate of the League of Nations until 1948. During that time, the country was torn by strife between the Jews, who wanted to make the land their homeland, and the Arabs who considered it their traditional home. Great Britain tried unsuccessfully to partition the country in 1937.

The arrival of Jewish refugees from Europe after the Second World War intensified the struggle, and in 1948 the

George Pickow, Three Lions

ON A SABBATH EVENING

Jewish children of Palestine light the candles on the Sabbath evening.

United Nations proposed a plan to partition the country into separate Arab and Jewish states. On May 15, 1948, the British mandate came to an end, and the next day the Jews proclaimed the establishment of the state of Israel. This announcement was the signal for war between the Jews and Arabs.

Southwestern Palestine is fertile and produces the chief crops—olives, figs, apricots, grapes, and grain. Salt, limestone, and sandstone are produced. The chief exports include wine, olive oil, and oranges. There has been considerable industrial development by the Jews at Tel Aviv and Haifa.

Consult the following titles for additional information:

- Bethlehem
- Canaanites
- Crusades
- Dead Sea
- Galilee
- Gethsemane
- Israel
- Jaffa
- Jericho
- Jerusalem
- Jesus Christ
- Jews
- Jordan
- Judea
- Nazareth
- Olives, Mount of
- Samaria
- World War I
- World War II
- Zionist Movement

PALESTRINA, *pah lase tre'nah,* GIOVANNI PIERLUIGI DA (1526-1594). The beautiful church music of Palestrina has for centuries served at once as the joy and the despair of composers who have succeeded him; for although his works form ideal models for study, they set an example of almost unequaled excellence.

Palestrina was named after the city in Italy in which he was born. His musical career began with his appointment by Pope Julius III as music director for the chapel of Saint Peter's Church in Rome. Later he became choirmaster in other churches in the city, and gained a wide reputation. Some years later he returned to Saint Peter's. But it was his compositions which made his name immortal. Because church music needed revision, he composed a mass which brought immediate praise and everlasting fame. It was written, like others which he composed later, in the simple, direct, and yet profoundly moving style of the day.

PALISADES, *pal i saydz'.* Rising abruptly from the west shore of the Hudson River, the towering, tawny cliffs of the Palisades extend from Fort Lee, N.J., northward as far as Piermont, N. Y. Of basaltic traprock, the beautiful precipices vary in height from 200 to 500 feet. Above and back of them there has been created the Palisades Interstate Park of about 48,000 acres, which provides camping and recreation space for numberless visitors from all parts of the country. The park extends as far north as Newburgh, N. Y.

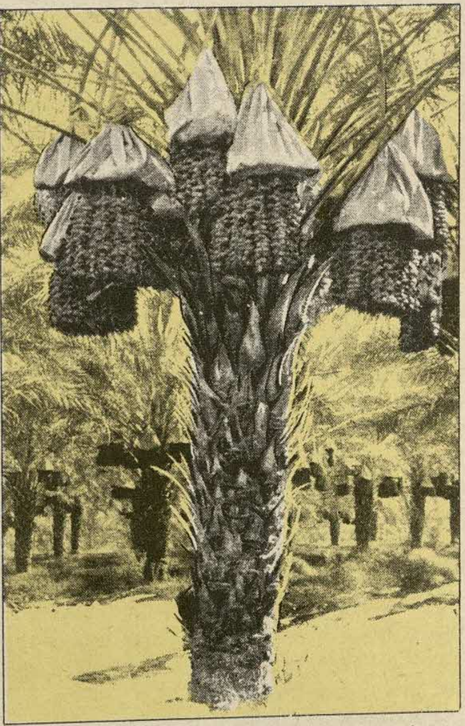
PALLA'DIUM. A rare, lustrous, silver-white metal, palladium belongs to the platinum group. It resembles platinum but is barely more than half as heavy. Palladium occurs in platinum ores and in the nickel ores of Sudbury, Ont. Because of its hardness, it is used in dentistry and in plating silver. Alloyed with platinum or gold, it is also used to some extent in the construction of scientific instruments. The white gold of jewelry is an alloy of palladium and gold. A peculiar property of palladium is its ability, when finely divided, to absorb one to three thousand times its own volume of hydrogen. The symbol for this element is *Pd*.

PALLADIUM. In a broad sense, a Palladium is any statue of the goddess Pallas Athena. The term is used to refer particularly, however, to a wooden statue of Athena at Troy. The Trojans believed that this statue had fallen from heaven, and that so long as they kept it, Troy was safe. Odysseus and Diomedes are said to have carried away the statue, making possible the capture of the city. The Romans claimed that the statue was taken to Rome, but other cities in Greece and Italy made the claim that they had it.

IMPORTANT SOURCE OF FIBERS
More than a hundred species of palms yield fibers of commercial importance.

PALM, *pahm.* Graceful and beautiful in their tall slenderness, palms are a familiar sight on tropical horizons. Comprising nearly 3,000 species, most of which are native to the tropics, palms attain a great variety of shape and size; some are long, slender vines several hundred feet in length, some are low, bushy plants whose leaves seem to spring directly out of the ground, and others are towering giants with sturdy trunks.

Palms have been divided into two classes



Right, courtesy Popular Mechanics

TWO CULTIVATED PALM TREES

Of all the oil-bearing nuts, the coconut, which grows on a palm tree (above), is the most widespread in the warm climates of the Western World. The fruit of another valued palm, the date (right), is sometimes protected by "raincoats."

according to the shape of their leaves. One group has pinnate (feather-like) or fern-shaped leaves and includes such varieties as the coconut and date palms. The other class has fan-shaped leaves, characteristic of the palmetto, the Washington, and Palmyra palms.

No tree is of greater importance to man. To the native of tropical lands it provides the three basic necessities of life—food, shelter, and clothing. To him, wrote Whittier, in *The Palm-Tree,*

> . . . . the palm is a gift divine,
> Wherein all uses of man combine—
> House and raiment and food and wine!

As food sources, the fruits of the date, coconut, bacaba, and sago palms are of particular value.

A durable and excellent timber is cut from the trunks of certain types of palms and is much used in the construction of ships, houses, and other articles where great wear is required. The wood of most palms is extremely tough and takes a high polish. The stems of certain palms are used in making wicker furniture, and palm leaves are used in the tropics to thatch native huts.

The fibres of certain palm trees are utilized in making brooms, hats, twine and rope, raffia for basketware, rattan for wickerware, upholstery, and fish nets.

Other by-products of the palm are various oils used in illumination and lubrication. Vegetable ivory from the ivory palm yields a hard substance which is employed in the manufacture of many small articles, and the thorny spines of some trees are used as needles and fishhooks.

Consult the following titles for additional information:

Betel
Coconut
Coir
Doum Palm
Ivory Palm
Palmetto
Palm Oil
Palmyra Palm
Sago

PALMET'TO. This palmlike tree is found from Eastern North Carolina to Florida and through the Bahamas and Cuba. It has an erect trunk reaching a height of sixty feet or more. The leaves are best described as being like a ragged palm-leaf fan. The leaves may be as much as seven feet broad, and are frequently used in thatching shelters of various sorts.

Palmetto wood is weak and spongy, but is used to some extent as piling for wharves. The new end buds are gathered and cooked like cabbages. Sometimes the tree is called *cabbage palmetto* because of this use. A fine brush fiber is secured from the leaf bases surrounding the end buds.

PALM OIL. Obtained from the pulp of the fruit of the oil palm, palm oil is extensively used in the manufacture of soap and candles and to lubricate machinery. The oil palm, found along the coast of West Africa, usually grows to a height of twenty-five feet and has a thick cluster of pinnate leaves at the top. It bears a large, ball-like mass of fruits about one and one-half inches long and about an inch in diameter. The oil, orange-yellow in color, resembles butter when hardened, and like butter becomes rancid after exposure to the air. Palm-kernel oil is also obtained from the plant. See OIL PALM.

PALM SUNDAY. Celebrating Christ's triumphal entry into Jerusalem just before His crucifixion, Palm Sunday is the last Sunday of Lent, the one immediately preceding Easter. It is named from the custom of using palm branches in the religious ceremonies held on that day.

PALMY'RA PALM. One of the most valuable of all trees, the palmyra palm is found in India, the Malay Archipelago, and tropical West Africa. With a trunk which grows from twenty to seventy feet in height, this tree is surmounted by a huge cluster of fan-shaped leaves which reach a length of about four feet. It supplies most of the needs of the natives in some sections of India. The young shoots are eaten as a vegetable, and the fruit of the mature tree is also edible. This palm produces an excellent wood, and the leafstalks make serviceable fences. Rope and twine are made from the fibers, and the leaves provide hats, baskets, mats, fans and thatching. See PALM.

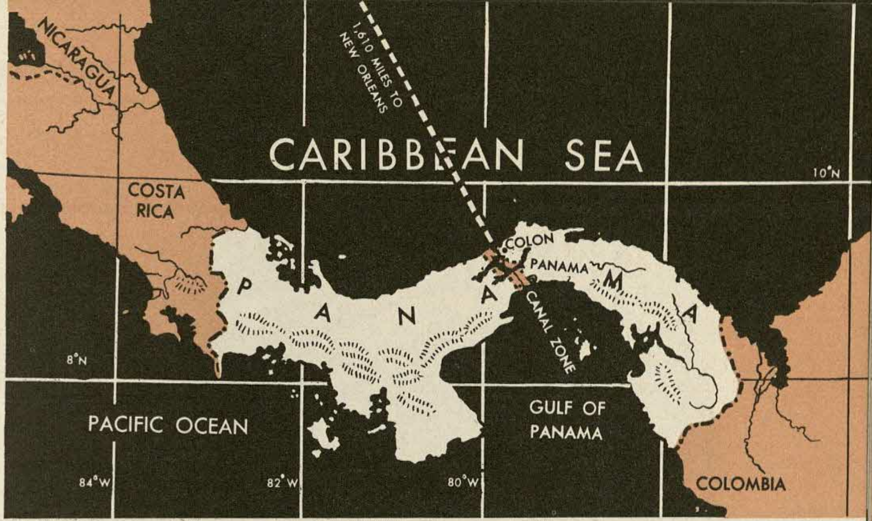
PALO ALTO, *pah'lo ahl'to,* BATTLE OF. On May 8, 1846, at the little town of Palo Alto, near Brownsville, Tex., an American army force of about 2,200 under General Zachary Taylor met a band of some 6,000 Mexicans commanded by General Arista. The first important battle of the Mexican War, the struggle lasted all day and resulted in victory for the Americans. See MEXICAN WAR.

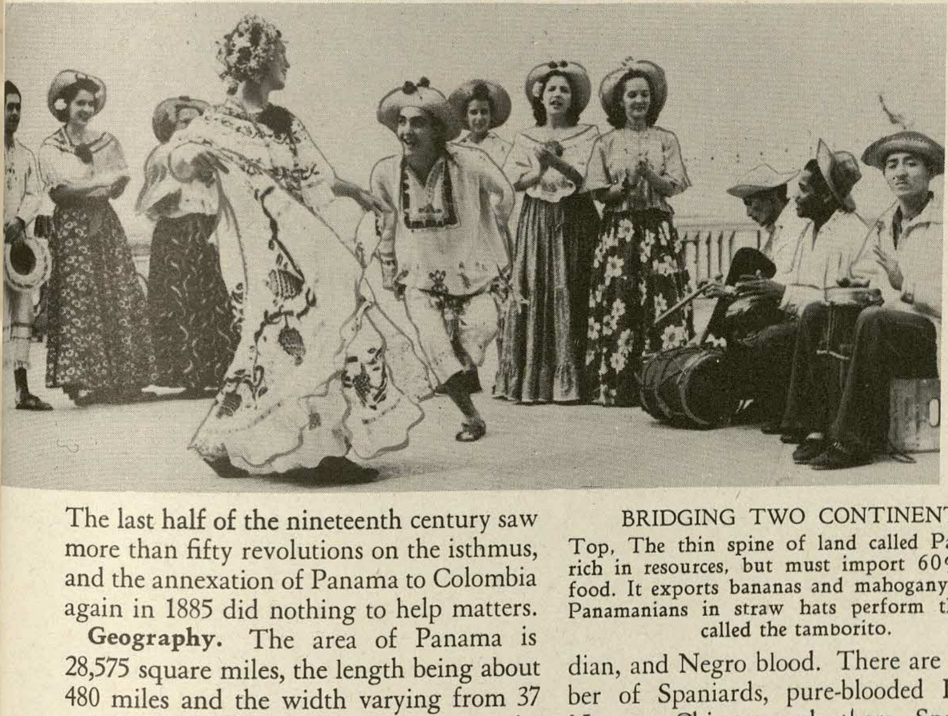
PAMIRS, *pah meerz',* THE. Called "the roof of the world," the Pamirs form a mountainous plateau in Central Asia. They are the hub from which radiate the world's loftiest mountains. The Tien Shan range extends to the northeast, the Hindu Kush to the southwest, and the Karakorum, Kunlun, and Himalaya to the east and southeast. This wild, rugged region covers an area of about 36,000 square miles. It has a general elevation of about 13,000 feet, and several of its peaks are more than 20,000 feet high. Among its peaks are the highest mountains in the Soviet Union, Mount Stalin (24,590 feet) and Mount Lenin (23,382 feet). In summer, nomads pasture their cattle in the valleys and along the slopes. In winter, the region is very cold.

PAN. Gay, mischievous, and carefree, Pan, the god of flocks and herds, was the principal woodland divinity of Greek legend. He is represented in art as a man with the horns, ears, beard, tail, and hoofs of a goat. Believed to be the son of Hermes, Pan was the inventor of the syrinx, or pipes of Pan. The worship of Pan was especially observed in Arcadia.

PANAMA, REPUBLIC OF. Ancient Darien today is Panama, a small republic in Central America. Even though the land is ancient in history, the republic is young, having been formed as recently as 1903. In that year the people of the isthmus, supported by the United States, revolted against the rule of Colombia and set up their own government. The new nation was immediately recognized by the United States.

Previously Panama had had a stormy history. Columbus sailed along its coast in 1502, and Panama was Spanish until 1821, when it became a part of Colombia. Then years later Panama joined New Granada.





BRIDGING TWO CONTINENTS

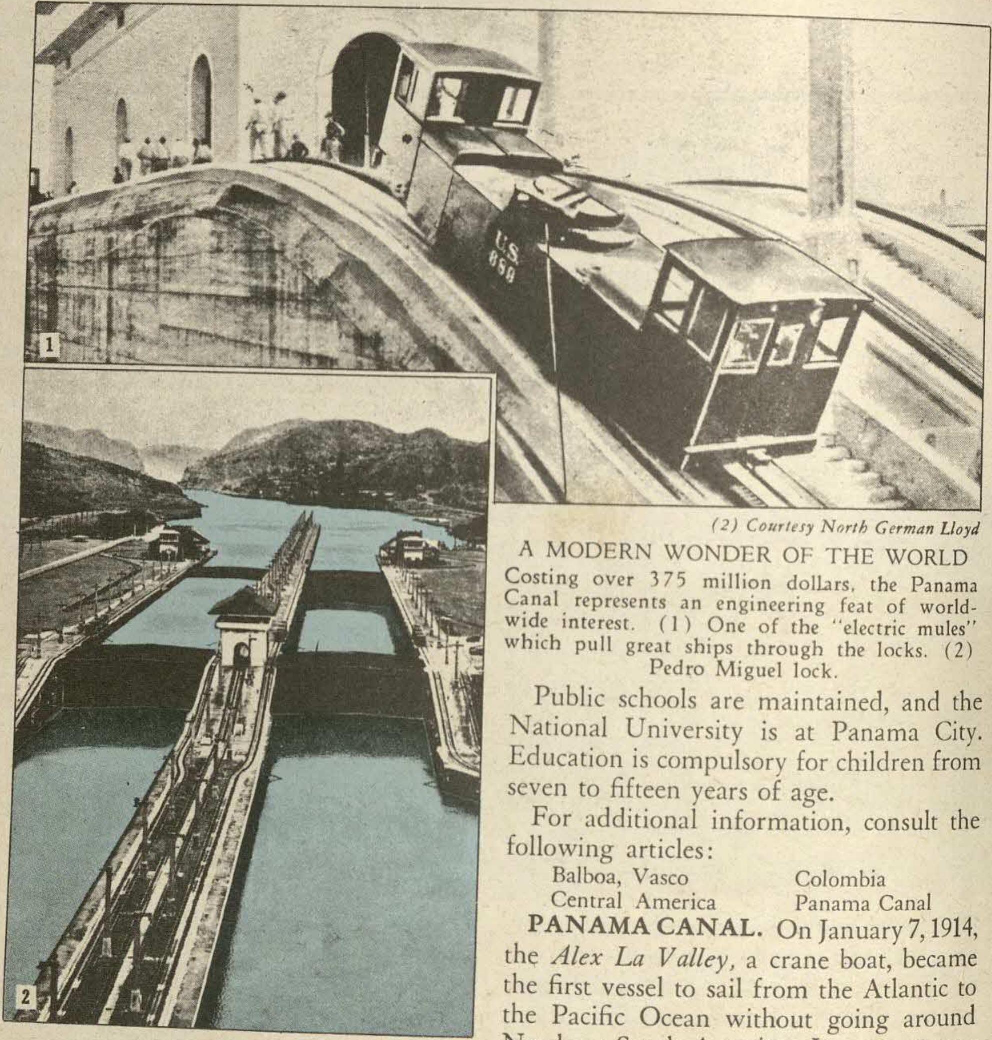
Top, The thin spine of land called Panama is rich in resources, but must import 60% of its food. It exports bananas and mahogany. Above, Panamanians in straw hats perform the dance called the tamborito.

The last half of the nineteenth century saw more than fifty revolutions on the isthmus, and the annexation of Panama to Colombia again in 1885 did nothing to help matters.

Geography. The area of Panama is 28,575 square miles, the length being about 480 miles and the width varying from 37 to 110 miles. The Caribbean Sea is on the north, the Pacific Ocean on the south, Costa Rica on the west, and Colombia on the east. Most of the country is hilly, interspersed with mosquito-plagued jungle swamps, and about half the land is uninhabited. Cutting across the little republic is the Panama Canal, situated in a Canal Zone leased to the United States.

People and Industries. The people of Panama number about 995,000 exclusive of those in the Canal Zone. Most of the population is *mestizo,* a mixture of Spanish, Indian, and Negro blood. There are a number of Spaniards, pure-blooded Indians, Negroes, Chinese, and others. Spanish is the language most widely spoken. The largest city is Panama City, the capital, on the Pacific coast: it has a population of about 128,000. The other large city is Colon, on the Caribbean coast, with a population of more than 52,000.

Most of the people are engaged in agriculture, bananas being the principal product. Rubber, coffee, coconuts, cacao beans, tobacco, and sugar also are raised. Cattle raising, too, is important. Pearls, coral, sponges, and tortoise shell are valuable re-



(2) Courtesy North German Lloyd

A MODERN WONDER OF THE WORLD

Costing over 375 million dollars, the Panama Canal represents an engineering feat of world-wide interest. (1) One of the "electric mules" which pull great ships through the locks. (2) Pedro Miguel lock.

sources. Timber products include mahogany and rosewood. Numerous minerals are found, but mining is not well developed. There are about 260 miles of railroads.

Government and Education. The country is governed by a one-house National Assembly composed of forty-two members elected for four-year terms. The President is elected by popular vote for one term of four years; he cannot be elected for the succeeding term. He is aided by a Cabinet of seven members. There are also two Vice-Presidents chosen by the Assembly. The country is divided into nine provinces, each administered by a governor.

Public schools are maintained, and the National University is at Panama City. Education is compulsory for children from seven to fifteen years of age.

For additional information, consult the following articles:

Balboa, Vasco
Central America
Colombia
Panama Canal

PANAMA CANAL. On January 7, 1914, the *Alex La Valley*, a crane boat, became the first vessel to sail from the Atlantic to the Pacific Ocean without going around North or South America. Its passage was through the Panama Canal, the realization of a dream 400 years old.

The canal, an engineering achievement hardly equaled by any other project in the modern world, has changed the course of water transportation for half the world. In point of time, the eastern coast cities of the United States and Canada are nearer to Japan than are Liverpool, London, or Hamburg. Before the canal was opened, sailing time from New York to ports on the west coast of North and South America was weeks longer than it is today. From New York to San Francisco the time has been reduced by about a month, and the long voyage to

Australia is much shortened. The Canal is the route for more goods than any other canal except the Suez.

Consisting of two parallel systems of lake-and-lock type of canals, the waterway is 50.72 miles long. It angles northwest to southeast, the Pacific end twenty-seven miles farther east than the Atlantic end. Going from the east to the west, a ship enters at Limon Bay in Colon and proceeds through a 500-foot channel to the Gatun locks, arranged in three lifts that raise the ship eighty-five feet. It then enters and crosses Gatun Lake, moving on to the Pedro Miguel lock to be lowered to the Miraflores Lake. The Miraflores locks lower it to the level of the Pacific. Complete passage usually takes seven to eight hours.

History of the Canal. Men of many centuries and of many countries dreamed and planned for a passage through the Isthmus. Some tried to dig it but climate, mountains, and jungle stopped them. In 1849 Cornelius Vanderbilt organized a company to con-

DITCH-DIGGER EXTRAORDINARY

The land link between North and South America long delayed shipping between the Atlantic and Pacific oceans. Some men dreamed of a passage through the Isthmus of Panama and others attempted to dig it. But it was George Washington Goethals who finally moved a mountain, dammed a river, and dug the big ditch called the Panama Canal.

John Hancock Mutual Life Insurance Company

struct a canal, but operations were abandoned after the sponsors had spent $2,000,000.

Actual work on the construction of a canal across Panama was undertaken first by a French concern headed by Ferdinand de Lesseps, builder of the Suez Canal. By 1888 the company had spent $200,000,000, but it had only done one third of the work and had become bankrupt, and finally the project was abandoned. The United States revived the idea of a Nicaraguan route in 1899, when a commission was appointed to study all possible routes; and in a few years the report was made. The Nicaraguan route was recommended, principally because of the high price asked by the defunct French company for its property and franchises in Panama.

The French firm, however, soon sold its properties to the United States for $40,000,000, and that country obtained from Panama a zone ten miles wide, through which the canal was to be built. The United States gave Panama $10,000,000 in gold, and agreed to pay an annual rental of $250,000. In 1939 the United States Senate ratified a treaty whereby the rental was increased to $430,000, because of the devaluation of the American dollar. Panama had revolted from Colombia in 1903, and in 1921 Colombia ratified a treaty providing that the United States pay $25,000,000 to satisfy Colombia's claims.

Swamps, mountains, rains, and other natural obstacles were overcome by Major General George W. Goethals, who was the engineer in charge of the 30,000 men building the canal. But none of these measured up to the danger of the mosquitoes that carry the dread malaria and yellow-fever germs. Had it not been for the work of William C. Gorgas, who instituted sanitary measures to ward off this plague, the canal probably would never have been completed (see GORGAS, WILLIAM C.). Seven years after actual construction was begun, the canal was finished, at a total cost of approximately $375,200,000. See NICARAGUA; PANAMA, REPUBLIC OF.

PAN AMERICAN CONFERENCES. At intervals since 1889, delegates from the independent nations of North and South America have met to consider matters of interest to all. The first conference assembled at Washington, D.C., on October 2, 1889. Its purpose was the establishment of an American customs union to encourage commerce and to simplify trade relations between the different countries. A notable result of the conference was the passage of a resolution creating the International Bureau of American Republics. In 1910 the name was changed to Pan American Union.

The second conference was held at Mexico City, 1901-1902, the third at Rio de Janeiro, 1906, and the fourth at Buenos Aires, 1910. Subsequent meetings were held at Santiago in 1923, at Havana in 1928, at Montevideo in 1933, and at Lima in 1938. Conferences were held at Havana in 1940, at Rio de Janeiro in 1942, and at Mexico City in 1945. Later meetings were held at Bogota in 1948, and at Rio de Janeiro in 1954.

At the 1948 conference, twenty-one of the North and South American nations formed the Organization of American States within the Union for mutual protection against aggression. See PAN AMERICAN UNION.

PAN AMERICAN UNION. The twenty-one American republics have provided themselves with a common meeting ground by the creation of the Pan American Union. The first International Conference of American States was held in Washington, D.C., in 1889-90, with James G. Blaine, Secretary of State, as the presiding officer. See PAN AMERICAN CONFERENCES.

The headquarters are in the beautiful Pan American Building in Washington, D. C., constructed through the generosity of Andrew Carnegie. The work of the Union is financed by contributions of the member nations, apportioned according to their population. The governing board is comprised of the United States Secretary of State, who is the chairman, and the ambassadors and ministers accredited to the United States by the members. A director-general is appointed to supervise the actual

FOR INTERNATIONAL AMITY
The Pan American Union Building in Washington blends North and South American architecture.

operation of the Union. Office employes are chosen from the member nations by a sort of civil-service arrangement.

The object of the Union is to "promote peace, commerce, and friendship between the republics of the American continent." The *Bulletin of the Pan American Union* is published monthly, in English, Spanish, and Portuguese editions.

PANCREAS, *pan'ķre as.* A soft, pinkish gland lying along the lower border of the stomach, the pancreas secretes the body's most important digestive juice. The pancreas is about seven inches in length, and is elongated and flattened, not unlike a dog's tongue in shape. The "sweetbread" sold in butcher shops is the pancreas of a beef animal. About a pint and a half of fluid is secreted a day by the cells of the pancreas. This is drained from the gland by a duct which joins the common bile duct, near where the bile duct opens into the small intestine.

As soon as the partly digested food leaves the stomach and enters the intestine, there is a quantity of pancreatic juice ready to work upon it. Saliva acts on starch, and gastric juice on protein foods, but the pancreatic juice digests all kinds of foods, and does its work more completely than the foregoing fluids (see illustration under DIGESTION).

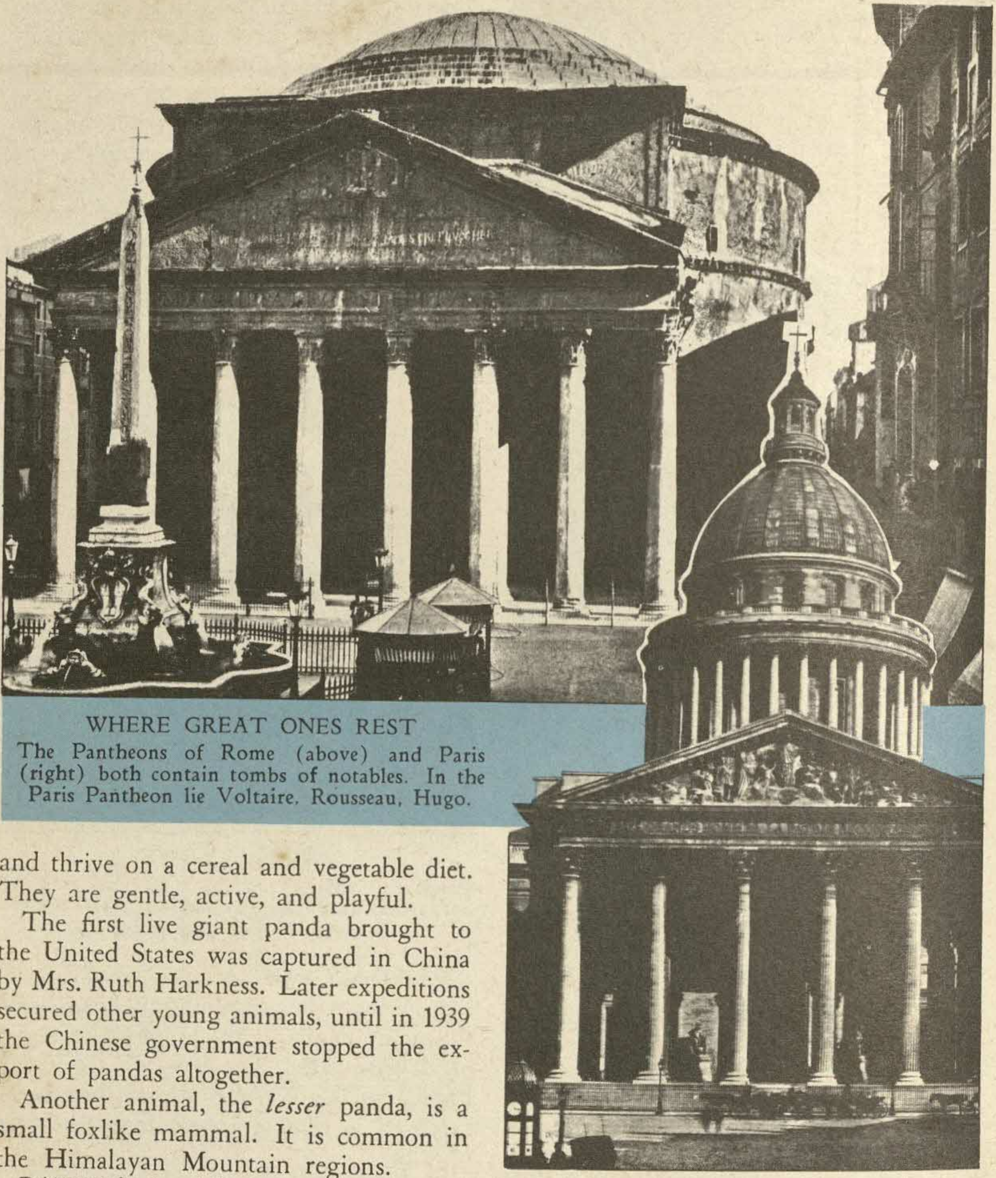
Extracts of the pancreas, insulin and protamine zinc insulin, are used to relieve diabetes.

ANIMAL CLOWN
Pandas in captivity display some very amusing antics, and their distinctive markings give them a naturally droll appearance.

PANDA, GIANT. A large, woolly, bear like animal with an ambling, awkward gait, the giant panda ranks among the rarest of all mammals. The few live specimens known to the Western World have been captured in remote mountainous districts of Tibet.

The animal has a most amusing appearance. Its body is covered with a heavy coat of white fur, from which its black, furry legs project. The large head is white, but the rounded ears are black, and black patches surround the eyes. Adult pandas attain a weight of 225 to 300 pounds.

Little is known of the habits of these animals in their native state, but the pandas in captivity enjoy cold weather



WHERE GREAT ONES REST
The Pantheons of Rome (above) and Paris (right) both contain tombs of notables. In the Paris Pantheon lie Voltaire, Rousseau, Hugo.

and thrive on a cereal and vegetable diet. They are gentle, active, and playful.

The first live giant panda brought to the United States was captured in China by Mrs. Ruth Harkness. Later expeditions secured other young animals, until in 1939 the Chinese government stopped the export of pandas altogether.

Another animal, the *lesser* panda, is a small foxlike mammal. It is common in the Himalayan Mountain regions.

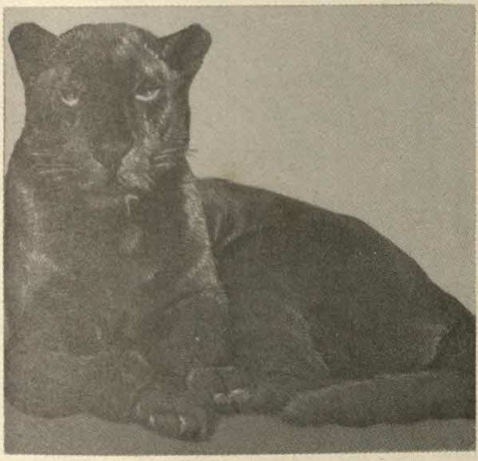
PANDO'RA. All the evils that befall men are the result of Pandora's curiosity, Greek legends relate. Pandora was the first woman on earth, according to these myths.

Zeus gave her a box and told her not to open it. But she disobeyed, and out of the box flew all the evils that were to beset man. The one blessing left was Hope, saved only because Pandora shut the lid in time.

PAN'SY. See VIOLET.

PANTHE'ON. It was the custom of the ancients to dedicate certain temples to all the gods. These temples were called pantheons. In Rome, the Emperor Agrippa erected such a temple about 27 B.C., and during the reign of Hadrian it was rebuilt with a circular domed roof. The Pantheon is the best preserved of the buildings of ancient times. It is chiefly of brick. The dome, one of the finest examples of its kind, is 142½ feet in inside diameter and has a twenty-seven-foot opening at the top, serving as a window. About the portico which forms the entrance there are sixteen Corinthian columns, thought to be from the original temple. Since 609 the building has been the Church of Santa Maria Rotonda. It contains the tombs of Raphael, Victor Emmanuel II, Humbert I, and other famous men.

The Pantheon of Paris, originally the Church of Sainte Géneviève, is a monumental building in which many illustrious Frenchmen are buried.



A RARE BIG CAT

A black panther is rare, hard to take alive.

PAN'THER. A large member of the cat family, the panther is now thought to be either identical with or a variety of the leopard of Asia and Africa, and the North American puma, also known as the *cougar* and the *American lion*. See LEOPARD; PUMA.

PA'PACY. See POPE.

PAPAL STATES, or STATES OF THE CHURCH. Until the latter part of the nineteenth century, a portion of Central Italy, known as the Papal States, was under the control of the Pope. Rome was the capital of the area, which comprised about 15,000 square miles. In 1860 most of the land except Rome and the Vatican was made a part of the kingdom of Victor Emmanuel. Ten years later, Rome became the capital of his kingdom. From this time until 1929, when Mussolini restored part of the Papal territory, the temporal power of the Pope was limited to the Vatican Palace. See VATICAN CITY.

PAPAW'. The papaw native to the United States belongs to the custard-apple family. One species is a small tree found all the way from the Southern states north to New York and the Niagara peninsula in Canada, and west to Kansas. It has purplish-red flowers, and is the most ornamental species. The fruit is oblong, two to six inches in length, with a greenish-brown skin. The rich-yellow pulp has an aromatic flavor, and in it are embedded flat, hard, black seeds.

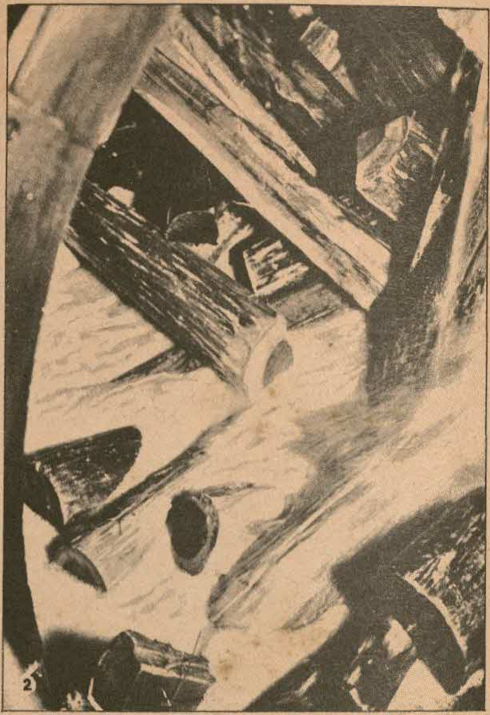
There is another plant sometimes known as papaw, which more properly is called *papaya.* It is a giant tropical herb found originally in Mexico and Central America along the Gulf of Mexico. It is a commonly cultivated plant in the Hawaiian Islands. Its fruit is melon-like in shape, weighs from ten to twelve pounds and has a thin, smooth skin yellow to orange in color. This fruit is edible, whether served fresh or cooked.

PAPER. Books, magazines, newspapers, writing tablets, tissue, stationery, wrappers —these are but a few of the articles made from paper, a substance invented more than 2,000 years ago by the Chinese.

Paper receives its name from *papyrus,* a plant from which the Egyptians made material for their scrolls. Yet the ancient Egyptians knew nothing of paper. Nor did the Greeks and Romans. It remained for the Arabs to learn the secret of the Chinese and to introduce paper to the Western World. To them we owe the knowledge of papermaking and its history.

Most of the paper of today is made entirely or in part from wood pulp, and the manufacture of paper is one of the biggest drains on the forests of the United States and Canada. There are four types of wood pulp. The first is secured simply by grinding the wood. The other types are secured by boiling wood chips under pressure in a solution of sulphur dioxide in calcium bi-

①


②

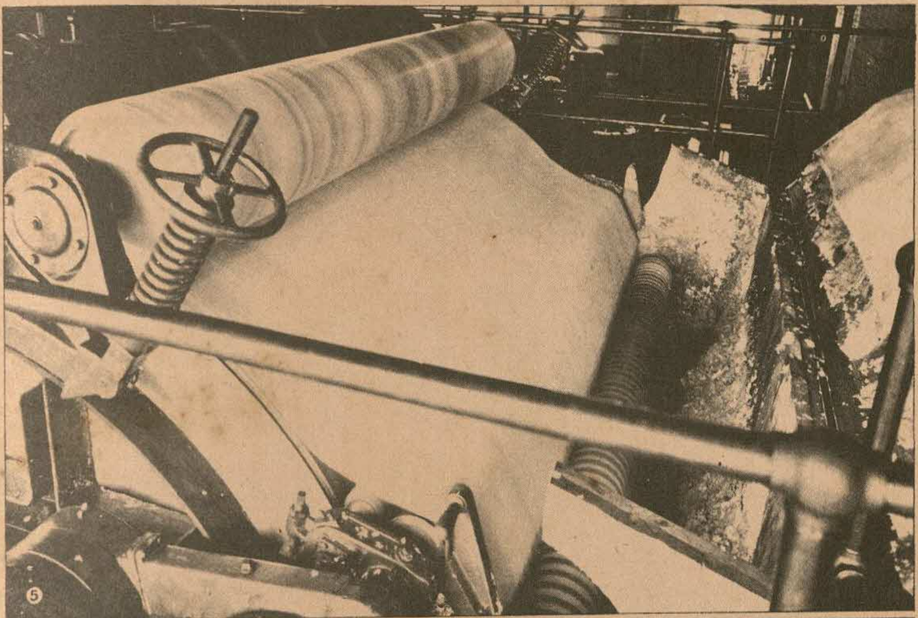
③

④

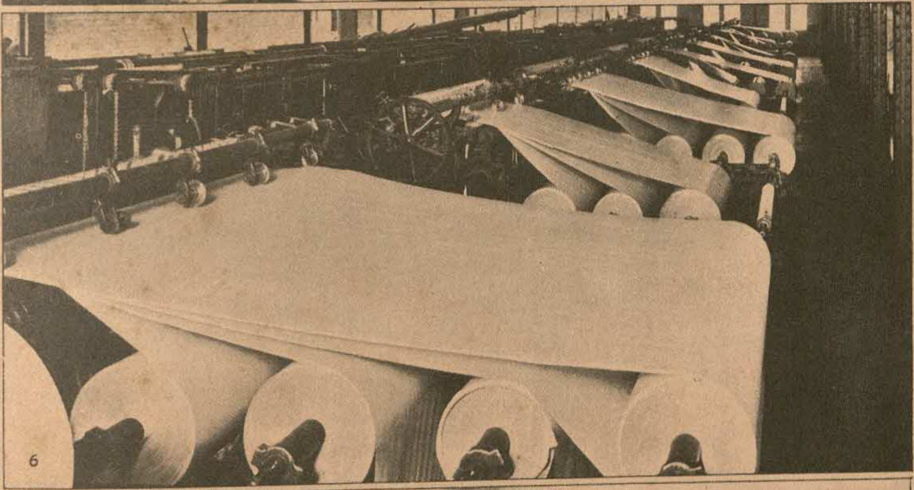
(3, 4) Courtesy Container Corporation of America

AN ANCIENT CHINESE PROCESS BROUGHT UP TO DATE

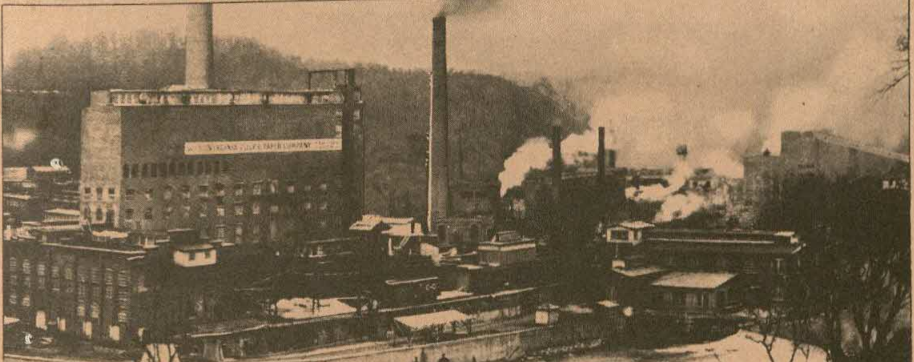
The modern paper mill turns rags and wood into paper in a continuous mechanical process. (1) Cut logs going up paper-mill conveyor from the yard to drum washer in the chip house. So many acres of forest are required to make newsprint paper for a single edition of a large newspaper that the country must soon look to other sources of raw material. (2) Washing stock in huge drum. (3) Beater in which wood pulp is agitated with water to make paper stock. The diluted pulp (4) is made into a web on a tremendously long Fourdrinier machine and run over rolls for a smooth surface (5, opposite page). It is then cut by machine to desired sheet size (6) and cured. (7) Layout of a large paper mill.



⑤



6



⑦

sulphite (the sulphite process); sodium hydroxide in water (the soda process); or in sodium sulphide, sodium hydroxide, and water (the sulphate process). Newsprint, the paper on which newspapers are printed, is chiefly composed of ground wood pulp, usually with some sulphite pulp added. The fibers of this pulp are short and weak, and newsprint quickly deteriorates and turns yellow.

The three chemical processes dissolve all the contents of the wood but the cellulose fibers. They produce better grades of paper than the simpler method. Most of the books printed in America are made of wood-pulp paper produced by chemical process, sometimes with an addition of rag fiber.

The brown paper used for wrapping heavy bundles is made from wood pulp. Manila paper is so-called from the use of Manila hemp in its manufacture, but actually little of this paper contains hemp.

Finer paper, for writing purposes and for documents that must be preserved, is often a rag paper. The best of it is entirely of rag fiber, but poorer grades are combined with other fibers. Formerly, paper was made almost entirely from linen or cotton rags ground up and beaten to a watery pulp. The pulp was floated on water and stirred continually to distribute it evenly. Shallow boxes, called *moulds,* were dipped into the tank to scoop out some of the pulp. The water drained out through a sieve at the bottom and the pulp was spread evenly over the screen at the bottom of the box. Inverting the mould over a layer of felt caused the pulp to fall on the felt; layers of felt would be placed over the pulp, and further pressing would squeeze out more water. Finally, the paper became dry enough to hold together. This paper was exceedingly strong, but it was rough and uneven.

Machinery has been substituted in modern paper manufacture, but the process is similar to older methods. The pulp is frayed mechanically by cylinders studded with sharp knives, and water to dilute it is added. The pulp then goes to a storage tank, from which it is pumped to the paper-making machine. The pulp is first treated with filler, sizing, and coloring, according to the type of paper which is being made. The machine forms it into webs or sheets, then dries it, and finally finishes it. Papers run through rollers under great pressure have a smooth, glossy surface and are said to be calendered.

Besides wood and rags, paper has been manufactured from esparto grass, straw, jute, and yucca.

For additional information, consult the following articles:

Book
Bookbinding
Papyrus
Printing

PAPRIKA, *pah pre′ ka.* Anyone who passes through the foreign quarter of a large city in late summer notices in the narrow backyards, and on the roofs, many boards on which long, narrow, red peppers, or *capsicums,* are drying. Among the peoples of Southern Europe, paprika, made from these dried capsicums, is a staple article, and although it is comparatively a new item in American kitchens, great quantities are imported annually. Hungarian sweet paprika, made from the shells alone, is the favorite. It is so mildly flavored that it is sprinkled on salads, put in French dressings, and sprinkled on stuffed baked potatoes and other light-colored foods to make a pleasing color combination, more often than it is used as a condiment.

PAPY′RUS. Histories and tales of antiquity live on in the scrolls of papyrus, seen today only in museums and found only in the ruins of ancient cities and tombs. This was the paper on which the Egyptians wrote, the product of a water plant that was once extensively cultivated in the lower reaches of the Nile River.

The plant has a large, creeping root and a thick, triangular stem which grows from three to ten feet in height. Although it is now rare in Egypt, the plant is found in other parts of Africa, in Palestine, and in Sicily. It is sometimes used to make clothing, boats, and sails. In making the scrolls, the Egyptians cut the stems into thin strips,

U.S. Dept. of Defense

IT'S A LONG WAY DOWN

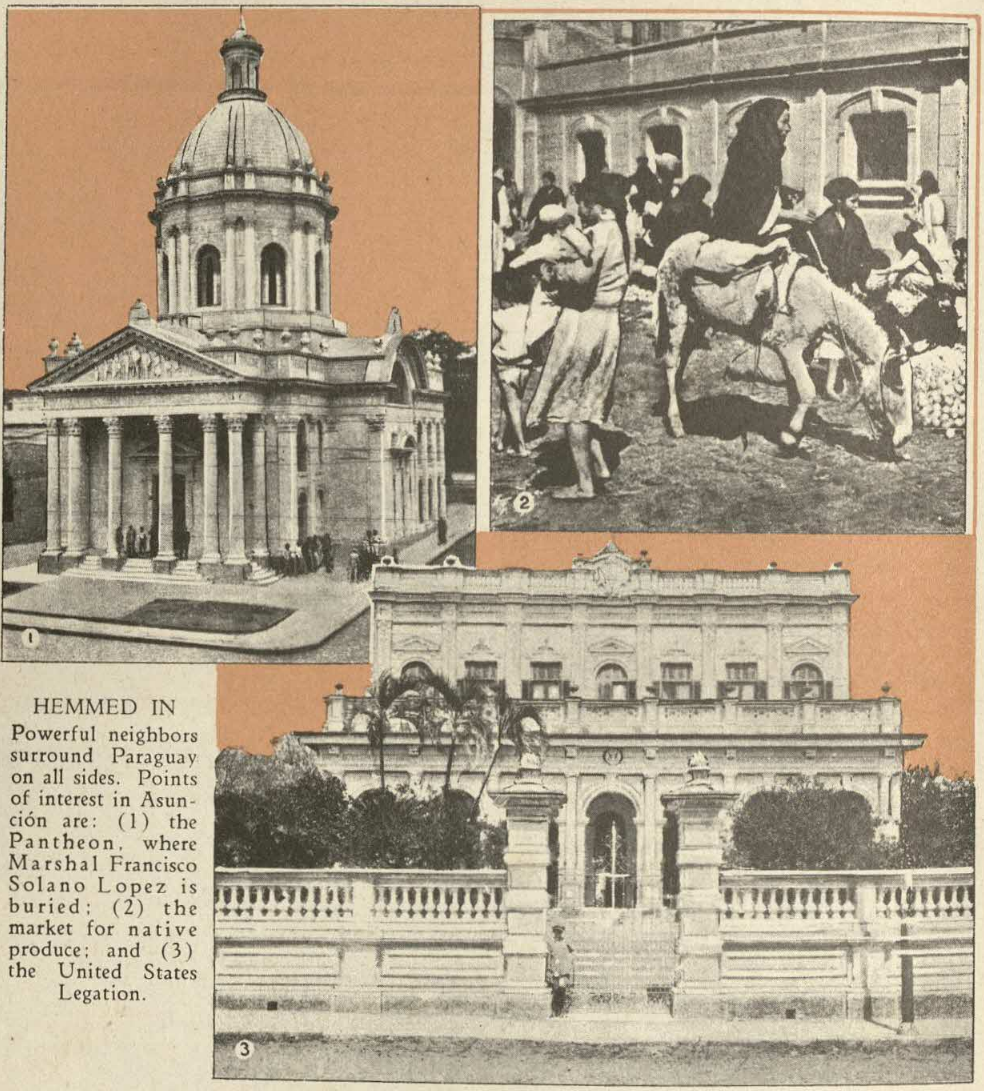
A surprise attack behind enemy lines is accomplished most effectively by parachute troops. Sometimes thousands of men are dropped in a few minutes.

laid them side by side, and placed other strips crosswise on top. All the strips were then pressed and gummed into a tough, smooth mat which was glued with other mats to form a scroll. To write upon the papyrus, a reed pen was employed. It was used as paper in Europe until the Middle Ages. See Book; Manuscripts; Paper.

PARACHUTE, *pair' a shoot.* This device enables persons to descend safely from airplanes in mid-air. Shaped like an umbrella, twenty-four feet in diameter, the parachute is generally made of nylon; untreated silk was used before World War II. The umbrella portion, or canopy, is connected by strong nylon cords to a harness, which is fastened securely to the body of the wearer. The parachute is folded into a pack, the style of which depends on whether it is to be worn on the chest or the back, or to hang below the flyer's hips. When a flyer jumps, he must wait until he has fallen clear of the plane before pulling the rip-cord, which opens a small *pilot parachute;* the pilot parachute pulls the large parachute from the pack. The large umbrella opens and fills with air, checking the fall of the jumper and allowing him to float slowly to earth. This is the *free-type* parachute. To the *automatic* type is attached a static cord, which the flyer, before jumping, fastens to a cable inside the plane; his weight pulling against this cord releases the canopy. Parachute troops (paratroopers), which play an important part in modern warfare, are equipped with both free-type and automatic parachutes. See Airplane; Flying, Story of.

PAR'AFFIN. A refined wax, paraffin in America is usually obtained from petroleum. Paraffin may also be obtained from a shale, and in Germany was produced from this source as early as 1850. Paraffin is used extensively for the manufacture of candles, and as a sealing material for covering jellies and sealing fruit jars.

PARAGUAY, *pair'a gway.* Hemmed in on all sides by Brazil, Bolivia, and Argentina, Paraguay is one of the two inland countries of South America. It possesses rich, fertile soil and extensive forests, but little has been done to exploit the natural



HEMMED IN
Powerful neighbors surround Paraguay on all sides. Points of interest in Asunción are: (1) the Pantheon, where Marshal Francisco Solano Lopez is buried; (2) the market for native produce; and (3) the United States Legation.

resources. Paraguay is in this respect a new country. Paraguay proper lies between the Paraguay and Paraná rivers and covers an area of about 62,000 square miles. In the north there is an area of about 100,000 square miles, called El Gran Chaco, a great plain that was claimed by both Paraguay and Bolivia. This territory was divided between the two republics in 1938.

Surface Features and Climate. Paraguay is crossed from north to south by the low Amambahy Mountains, which separate to the east and west and form the watershed between the tributaries of the Paraná and Paraguay rivers. The northern portion of the country is composed mainly of grasslands or prairies; the southern section contains fertile alluvial soil and is heavily wooded. The entire country is well watered by the numerous streams that flow between the low mountains. The Paraguay River is a wide, deep stream and serves as a great water highway for the country, being navigable at all times.

The subtropical climate which is typical in this latitude is greatly tempered by the mountains and the numerous rivers. The climate is mild, with rainfall amounting to about sixty-two inches a year.

Production and Commerce. Fertile soil and mild climate are favorable to the production of large crops, and more than half the land area is used for agricultural purposes. *Yerba maté,* a strong Paraguay tea, is the leading crop. Tobacco is also important, as are sugar cane, rice, corn, cotton, indigo, bananas, and oranges. In the plains areas livestock raising is of great importance. The extensive forests contain cabinet and dye woods, resins, and balsam. Mineral deposits include iron, manganese, and copper.

The manufactures of the country are confined chiefly to meat packing, lacemaking, lumbering, sugar refining, and tanning. The country imports such goods as foodstuffs, textiles, hardware, machinery, and chemicals. Its chief exports include oranges, *yerba maté,* timber, cotton, hides, tobacco, meat, and fruit.

The People and Their Institutions. The natives of Paraguay are Indians known as Guaraní, who live chiefly in the farming regions. Most of the inhabitants, however, are of Spanish blood. The people of mixed Spanish and Indian blood are found for the most part in the cities. There are almost no Negroes in Paraguay. The total population is about 1,677,000. The capital and largest city is Asunción, with a population of more than 210,000.

The Roman Catholic faith is the established religion, although complete freedom of worship is allowed. The educational system is not well developed, although school attendance is both free and compulsory in Paraguay.

History. Spain lost control of the country in 1811 but gaining independence did not mean freedom for the people of Paraguay. In modern Paraguay, they have had to be continually ready for changes in the control of their government. The country's history has been largely a story of war and a struggle for survival since the revolt from Spain in the early nineteenth century. Until recent years, there has been little attempt at national development.

Trade agreements signed with Brazil have been a mark of recent economic progress despite political troubles in the country. One such treaty provides for the establishment of a Paraguayan trade route over Brazilian territory in an effort to correct Paraguay's land-enclosed position. An assignment of surplus commodities was also secured from the United States.

A national merchant marine operates in the River Plate basin to carry both exports and imports to the ocean. The railroads in the country are British owned.

PARANA, *pah rah nah'.* One of the most important waterways of the world, with a drainage area almost as large as that of the Mississippi River, the Paraná River, 2,450 miles long, is the second largest river in South America. Rising in Brazil, it is formed by the junction of the Rio Grande and Paranahyba rivers. It forms the bounary between Brazil and Paraguay and also that of Paraguay and Argentina, and then sweeps down through Argentina to the Plata, a large inlet on the Atlantic Ocean.

The Paraná's largest tributary river is the Paraguay, which joins it about 850 miles from the Plata. Part of the river is divided into two parallel channels, and near its mouth it is nearly thirty miles wide. The Paraná has two gigantic falls—the Falls of Guayra, located above the junction with the Paraguay; and the great Iguassú, or Victoria, Falls at the point where the Iguassú River enters the main stream. The river is navigable and important commercially, for ocean steamers are able to ascend it 400 miles, and small steamers nearly 1,000 miles.

PAR'ASITE. Any plant or animal which fastens itself to, and draws its food from, another plant or animal is a *parasite;* the plant or animal so afflicted is the *host.* Parasites which live on animals or human beings are found both internally and externally. Those which exist internally, such as the flukeworm and hookworm and many disease germs, are destructive and often deadly, and are difficult to combat. Parasites which attack externally, such as mosquitoes, ticks, fleas, bedbugs, and chiggers, often carry disease, and their bites may become infected.

In the vegetable world, rusts, mildews, and smuts are responsible for great losses in crops. The mistletoe is a parasitic plant which grows on trees, chiefly on oaks; the dodder attaches itself to alfalfa and clover.

PAR'CEL POST. Immensely valuable to American businessmen and to the public is the parcel-post service maintained by the United States Post Office Department. By means of this service, goods of almost all kinds which do not fall under first- or second-class postage rates may be shipped safely and speedily at a small cost.

The merchandise shipped by parcel post, known as fourth-class mail, must be wrapped securely and addressed plainly. On the outside of the package, the name and address of the sender must also appear. Rates vary according to the distance and weight, and the packages may be sent C.O.D. and insured for a small additional cost. Greeting cards or invoices also may be included in a parcel-post package, but any additional written material must be sent as first-class matter. Small additional charges also are made if the package is to receive special handling. In order to come within the fourth-class rates, the package must weigh over eight ounces, but not more than 70 pounds. Its combined length and girth must not be more than 100 inches. Under eight ounces, parcels go third class.

PARCH'MENT. Despite the scientific accomplishments of modern civilization, nothing has been found to outlast parchment as a writing material. Made from the skins of sheep, cattle, goats, and other animals, it is strong and wears through the years without losing its texture or strength. A fine parchment, called *vellum,* is made from the skins of kids, calves, and unborn lambs and is used for bindings on rare books and for legal documents and diplomas. Coarser parchment is used for drum heads. In making parchment, the hair or wool is removed from the skin, which is then placed in lime to remove the fat. Scraping the skin and rubbing it with pumice stone causes it to become smooth and uniform.

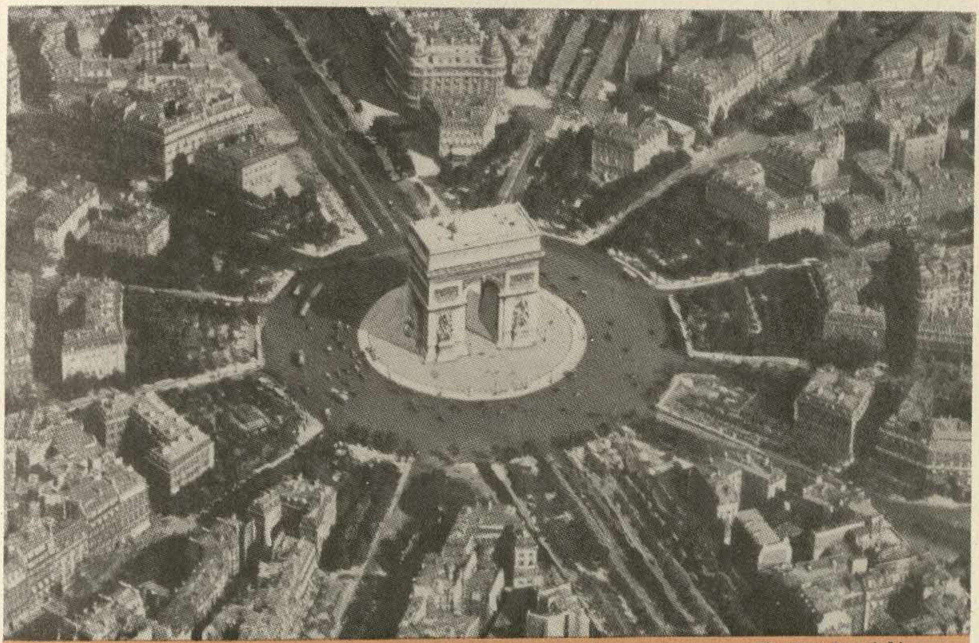
PARENTS AND TEACHERS, NATIONAL CONGRESS OF. A familiar part of nearly every school is the association of parents and teachers, an organization founded to stimulate interest on the part of the parents in their children's education and to foster cooperation between parents and teachers. The organization has developed into a powerful support to the public-school system and has had an important effect on educational policies.

First established in 1897 as the National Congress of Mothers, the organization became the National Congress of Mothers and Parent-Teacher Associations in 1908, and finally, in 1924, became the National Congress of Parents and Teachers. The congress first emphasized discussion of school problems between parents and teachers, but it has extended its work to include study and training for parents in child welfare. The congress carries on its activities through several departments—organization and research, extension, public welfare, education, home service, and health. It publishes the magazine *Child Welfare,* and maintains headquarters at Washington, D. C.

PARIS. Ancient Troy was destroyed because of Paris, according to Greek mythology. The son of King Priam and Hecuba, Paris was left by his mother to die on Mount Ida when he was an infant because Hecuba had been told by priests that he would cause the city's downfall. He was found, however, by shepherds; and when he grew up, he married Oenone, a nymph.

Yet Paris was destined to fulfill the prophecy. He was chosen to select the fairest of the three goddesses, Hera, Athena, and Aphrodite, in a contest. He selected Aphrodite and thus gained the enmity of the other two. The reason for his choice was Aphrodite's promise that the most beautiful woman in the world would become his wife.

Sometime later, Paris visited Menelaus, king of Sparta, and fell in love with Helen, his beautiful queen. While Menelaus was away, Paris took Helen to Troy. He thus caused the Trojan War; for when Menelaus returned, he and the other Greeks set out for Troy to recapture Helen. Paris was killed in the war; and Troy, as the priests had foretold, was destroyed. See HELEN; TROY.



Courtesy French Line

TRIUMPHAL ARC DE L'ETOILE

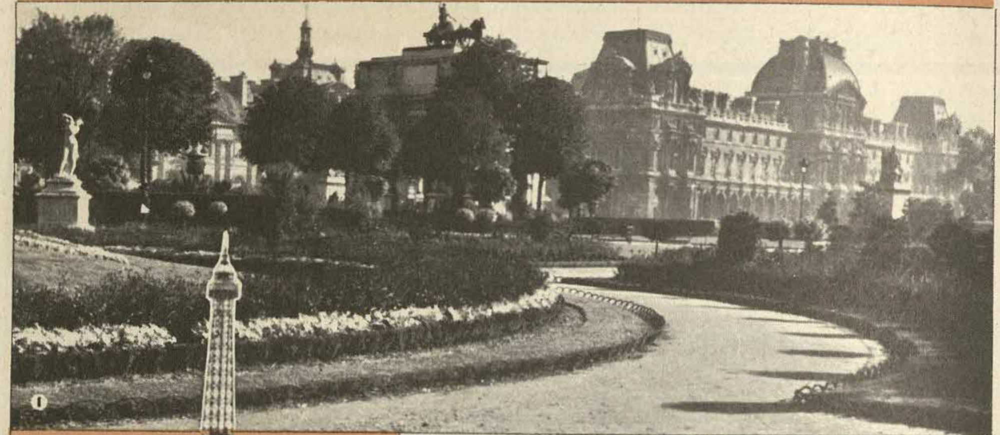
Beneath the arch burns an eternal flame honoring the Unknown Soldier.

PARIS, FRANCE. Impressive for its beauty, worldly in its age, the city of Paris, capital of France, combines the old and the new in a manner unsurpassed by any other metropolis in the world. It has been said that Paris is ever youthful; and this statement is almost true, for the city possesses a unique zest and vigor.

Paris is the home of style and fashion, yet her streets are often the battleground of political and economic theories. Paris, with her sidewalk cafes and love of gaiety, is often pictured as frivolous, yet she has seen revolutions that shook the world and has unwillingly harbored enemy armies. Paris today is a seat of art and learning, but she can produce some of the finest fighting men in the world. She has been the home of great scholars and geniuses, yet her citizens many times have heard the roar of enemy guns near her gates.

Description. Paris is located in the northern part of France and on both sides of the twisting Seine River. The streets have no definite plan, for the city was old long before people thought of building streets wide and straight. But there are many boulevards unsurpassed in beauty, and a transportation system embracing all forms of carriers. Despite crowded conditions, Paris is clean and has good facilities for sanitation.

Fine bridges span the busy Seine, and stone quays border the banks of the river. On the Ile de la Cité, in the center of the river, are many public buildings. The city abounds in beautiful churches and cathedrals, among which is Notre Dame, an excellent example of Gothic architecture. Railroads and air lines connect the city with all other centers of Europe and with the important ports of the continent.



(3) Ewing Galloway
(4) Courtesy American Express Co.

PARIS IN THE SPRING

The return of warmer weather brings a wave of gaiety to this gay capital. Citizens and visitors alike dress in their best and promenade the Grands Boulevards. (1) The Garden of the Tuileries, with the Louvre in the background. (2) The Eiffel Tower. (3) In Montmartre. (4) The Champs Elysées.

Surrounding the oldest section of the city are the *Grands Boulevards;* another circle circumscribes the old suburbs; still another system extends out to the newer suburbs. Many squares are located in the city, from which important thoroughfares radiate. The famed Champs Elysées runs from the Place de L'Etoile, containing Napoleon's Arc de Triomphe, to the Place de la Concorde, the scene of some of the bloodiest events of the French Revolution. The Tuileries, the playground of Paris, is near by; and farther on is the Louvre, most famous art museum in the world. The Hôtel des Invalides, containing the tomb of Napoleon, is across the river to the south. Still farther south are the Luxembourg Gardens; and to the east is the Jardin des Plantes, one of the finest botanical gardens in the world.

Besides the Louvre, Paris also is the home of the Luxembourg Palace, once the residence of royalty, now an excellent art museum. A huge Oriental building on the north bank of the Seine, the Palace of the Trocadéro, was replaced by the Palais de Chaillot in 1937 as a part of the architectural program of the Paris Exposition of that year. The Eiffel Tower is across the river, and the Palace de l'Elysée, home of the President of France, is northwest of the Place de la Concorde. Some other notable buildings include the Palace of Justice, the Hotel de Ville, the Church of the Madeleine, the Pantheon, Grand Opera House, the University of Paris, the Sorbonne, and the Bibliothèque Nationale. The parks and squares of Paris also are adorned with numerous statues, columns, and historical monuments.

Government. The national government of France controls the fortunes of the city, but there is an appointed prefect and also a town council, consisting of four members from each of the twenty arrondissements, or districts. Each district has a mayor and three assistants who levy and collect the taxes under control of the municipal council. The city operates many of the utilities, and the police department is famed the world over for its efficiency. Public education is provided through the high school.

Manufacturing. Most of the manufacturing in the city has been done in numerous small factories, but larger establishments have been coming into existence. Paris is especially noted for its luxury products, such as perfume, fashionable women's clothing, jewelry, and other articles treasured by people who desire fine things.

A MELLOWED OLD FACADE

The gray mass of medieval Notre Dame beside the Seine dominates the Ile de la Cité.

History. The great city traces its lineage back to a Gallic village which was existing at the time of Caesar. The name *Paris* was adopted in the fourth century A. D., and in the sixth century Clovis made it the seat of government. Paris became the capital of the kingdom in the tenth century and has remained the largest and most influential city of France ever since.

The treaties that concluded the Franco-German War and the First World War were signed in Versailles, a suburb of Paris. The capital city was successfully defended in World War I, but in World War II it was occupied by the Germans from June 14, 1940, to August 25, 1944.

The population of Paris proper is about 2,850,000; Greater Paris has a population of about 6,600,000.

For additional information, consult the following articles:

Bibliothèque Nationale
Louvre
Notre Dame, Cathedral of
Seine
Versailles
Versailles, Palace of
World War (I, II)

PARIS, Treaties of. A number of peace treaties have been signed at Paris.

Treaty of 1763. By this treaty between France and Spain on one side and England and Portugal on the other, at the end of the Seven Years' War, Canada, Prince Edward Island, Cape Breton, and the territory of France east of the Mississippi (except New Orleans) were given to England. British supremacy in India and Nova Scotia was established. To Spain, France ceded New Orleans and all her territory west of the Mississippi. Spain relinquished Florida to England. The American phase of the struggle is called the French and Indian War.

Treaty of 1783. At the close of the American Revolution, English and American representatives met at Paris. The United States was recognized as an independent nation extending from the Atlantic to the Mississippi and from the Gulf of Mexico to the forty-fifth parallel.

Treaty of 1814. After Napoleon's abdication, the combined European powers signed a treaty with France. By the terms of the treaty France lost practically all conquered territory but regained most of her colonies; Holland was restored to the House of Orange; the independence of Switzerland was recognized; and Italy and Germany were recognized as aggregations of independent states.

Treaty of 1815. After Napoleon's defeat at Waterloo, the Allies and France concluded a second treaty, by which France lost the frontier territory acquired under the preceding treaty and was assessed an indemnity of $200,000,000.

Treaty of 1856. At the close of the Crimean War, this treaty was signed by the Great Powers, opening the Black Sea to merchant craft and closing it to war vessels. The Danube River was declared open to all navigation and Turkish independence was recognized.

Treaty of 1898. This treaty ended the Spanish-American War. Spain relinquished Cuba and ceded to the United States the Philippine Islands, Guam, and Puerto Rico for $20,000,000.

Treaty of 1919. Prior to the Versailles conferences, the Allies and Central Powers met at Paris to arrange a peace treaty at the close of World War I.

PARIS GREEN. Composed of arsenic trioxide and copper acetate, Paris green is an extremely poisonous powder used chiefly as an insecticide. It is sprayed on plants as a powder or is mixed with water. Paris green does not dissolve in water, but must be kept in suspension by stirring.

PARK'ER, Francis Wayland (1837-1902). An outstanding figure in American education, Francis Wayland Parker is particularly noted for his advocacy of a natural method of teaching rather than the old formal style of instruction. He was born in Bedford, N. H. He served in the Union army during the Civil War. In 1872 he went to Berlin to study, returning to America in 1875. He was principal of the Cook County (Ill.) Normal School from 1883 to 1896, and of the Chicago Normal School from 1896 to 1899. In 1899 he became president of the Chicago Institute, which three years later was incorporated into the School of Education of the University of Chicago.

PARK'MAN, Francis (1823-1893). Valuable information regarding the battle for empire in North America between the French and the British is contained in the books of Francis Parkman, a famous New England historian.

Parkman went West to see for himself the frontiers of America and to study the lives of Indians and the great land that lay beyond the Alleghenies. This life ruined his health, and he became partially blind. But he obtained first-hand evidence of the struggle for America and became an authority on this phase of history. In addition, he went to France to study related documents.

His books include: *The Conspiracy of Pontiac; The Jesuits in North America; La Salle and the Discovery of the Great West; Montcalm and Wolfe; The Oregon Trail; France and England in the New World; The Old Regime in Canada; A Half-Century of Conflict;* and *Count Frontenac and New France Under Louis XIV.*

U.S. Dept. of the Interior
Burlington Route Photo
Glacier National Park

INVESTMENTS IN NATURE

Future generations in North America will be particularly fortunate in that present governments have had the foresight to set aside great areas as national parks. (1) Grand Teton Park. (2) Yosemite Falls. (3) Going-to-the-Sun Mountain, Glacier National Park.

PARKS, National. Towering peaks; skyward-shooting geysers of scalding hot water; enormous colorful and fantastic caves—these are only a few of nature's scenic wonders which may be viewed in the National Parks of the United States. There are twenty-eight parks in the country and outside territories, visited annually by millions of people. No other country in the world, except Canada, provides its citizens with such large and magnificent playgrounds. The parks are open to the general public and are administered by the National Park Service under the Department of the Interior.

A list of the parks and their distinctive features is given in the accompanying table

UNITED STATES NATIONAL PARKS

NAME	LOCATION	YEAR ESTAB.	AREA (acres)	IMPORTANT FEATURES
Acadia	Maine Coast	1919	30,865	Mount Desert Island; magnificent mountain, lake, and ocean scenery
Big Bend	W. Texas	1944	694,225	Mountain and desert scenery; unusual geological formations
Bryce Canyon	S. W. Utah	1928	36,010	Canyon of colorful eroded pinnacles
*Carlsbad Caverns	S. E. New Mex.	1930	45,847	Large caverns; colorful limestone-decorated interiors
Crater Lake	S. W. Ore.	1902	160,290	Beautiful blue lake in the heart of an extinct-volcano crater
Everglades	S. Florida	1947	1,258,670	Subtropical plants and animals
*Glacier	N. W. Mont	1910	999,567	Sensational alpine-like scenery; lakes; sixty small glaciers
*Grand Canyon	N. Central Ariz.	1919	673,108	Largest and most colorful canyon in the world
Grand Teton	N. W. Wyo.	1929	299,326	Part of Teton Mountains with towering, snow-capped peaks
Great Smoky Mountains	N. C. and Tenn.	1930	507,542	Rolling, mountainous area; dense forests; shrubs and flowers.
Hawaii	Hawaii and Maui.	1916	176,951	Interesting area of active and extinct volcanoes
Hot Springs	Middle Ark.	1921	986	Noted hot-water springs reputed to have healing qualities
Isle Royale	Michigan	1940	539,339	Densely forested islands; ancient Indian copper pits
King's Canyon	Middle E. Calif.	1940	453,718	Canyons; snow-capped mountains; giant sequoias
Lassen Volcanic	N. Calif.	1916	104,241	Contains the only recently active volcano in U. S.; hot springs and geysers
*Mammoth Cave	S. W. Ky.	1936	50,696	Series of caverns; famous onyx-cave formation
Mesa Verde	S. W. Colo.	1906	51,018	Prehistoric Indian cliff dwellings
*Mount McKinley	S. Central Alaska.	1917	1,939,319	Mount McKinley, highest mountain in North America; beautiful scenery
*Mount Rainier	W. Central Wash.	1899	241,571	Snow-capped mountains; many glaciers
Olympic	N.W. Wash.	1938	888,558	Forests, glaciers; summer feeding ground of rare Roosevelt elk
Petrified Forest	N. Arizona	1958	86,000	Six forests of petrified trees
Platt	S. Okla.	1906	912	Many springs with distinctive mineral properties
*Rocky Mountain	N. Colo.	1915	255,706	One of the finest and most scenic sections of the Rocky Mountains
Sequoia	Middle E. Calif.	1890	385,258	Numerous huge sequoia trees; Mount Whitney
Shenandoah	N. Va.	1935	193,473	Section of the Blue Ridge Mountains; fine scenery
Virgin Islands	St. John	1956	5,000	Strange trees; fine beaches; Indian relics and Danish ruins
Wind Cave	S. D.	1903	27,893	Cavern with miles of galleries and chambers; unusual formations
*Yellowstone	N. W. Wyo. S. W. Mont. N. E. Idaho	1872	2,213,207	Geysers, boiling springs, petrified forests, Grand Canyon of Yellowstone, lakes, waterfalls
*Yosemite	Middle E. Calif.	1890	757,827	Valley of gorgeous scenery, high waterfalls, lofty cliffs
Zion	S. W. Utah	1919	94,241	Magnificent, deep gorge with sheer walls; colorful rocks

**Park described in detail elsewhere under separate title.*

PARLIAMENT, *pahr′li ment.* In some countries, particularly Great Britain and her Dominions, the Parliament is the legislative branch of the government. In Great Britain it is composed of two houses, the House of Commons and the House of Lords. Members of the Commons are elected by the people; the House of Lords is comprised of the *lords temporal,* or peers (both hereditary and those created by the Crown), and the *lords spiritual,* clergy of the Anglican Church. See GREAT BRITAIN.

The Canadian Parliament was established by the British North America Act and consists of two houses, the Senate and the House of Commons. See BRITISH NORTH AMERICA ACT; CANADA, DOMINION OF.

PARLIAMENT′ARY LAW. Legislative bodies, councils, clubs, lodges, and most other deliberative groups are usually organized and conducted under rules of parliamentary law. The purpose of these rules is to permit an orderly procedure of meetings. In general, parliamentary law is universal in its application. In this day of club life and group activity, everyone should be familiar with the elementary principles involved.

How Societies Are Organized. In organizing a society, someone first calls a meeting of those interested and acts as a temporary chairman until a permanent chairman is elected. The temporary organization is complete after a temporary secretary (*secretary pro tem*) has been chosen.

To make the organization permanent, a committee is appointed to draw up a constitution, which usually states the purpose of the organization, the qualifications for membership, and the number of officers and their duties. In addition to the constitution there are by-laws which state, among other things, the order of business, place and time of meeting, dues of members, and the manner in which the organization's business is to be transacted.

All the original members vote on the constitution and, if they approve it, sign it; new members, in turn, sign it after they join the organization.

Officers. The necessary officers for any organization are the president, vice-president, secretary, and treasurer. The last two offices may be combined if desired.

The president presides at all meetings and sees that the rules of parliamentary law are followed and the constitution upheld. He may sign the minutes of the meetings after approval.

In the absence of the president, the vice-president discharges his duties.

It is the duty of the secretary to keep a record of all meetings and the business transacted, to act as keeper of reports and documents, and to conduct the correspondence of the organization unless there is a corresponding secretary.

All funds are kept by the treasurer, who pays bills approved by the organization. He should, at stated intervals, report on the receipts and expenditures of the organization.

How a Meeting Is Conducted. After the president has called the meeting to order, the customary order of business is followed. First the minutes of the preceding meeting are read by the secretary and approved (or corrected) by the members. Then follow reports from regular committees (program, welfare, finance, etc.) and special committees. All business not completed at the previous meeting (old business) is then taken up and completed. The president then calls for new business.

A thorough knowledge of motions and their procedure is important. All business should be brought before a meeting in the form of a motion. Any member desiring the floor, that is, an opportunity to speak, arises and addresses the chairman as "Mr. President" or "Madam President," as the case may be. The president recognizes the member by speaking his name in a formal manner. The motion is then stated by the member and repeated by the president.

It is customary for someone else who favors the motion to voice his approval with, "I second the motion." To do so, a member need not rise or address the chairman. The motion is then ready to be discussed and voted upon by all the members. Motions are either main motions or subsidiary motions. They may be amended; placed on the table, that is, postponed until the next meeting; referred to a committee for further consideration; cast out; or approved. Some motions have precedence over others. When a member moves the previous question, he is making a motion to stop debate on the motion on the floor and is calling for a vote.

Voting may be conducted in three ways, by voice, hand, or secret ballot (writing). In a vote by voice, the chairman asks those in favor to answer "aye"; next those against, by "nay." If the result is doubtful, a show of hands of those in favor and those against should be made and counted. In a secret ballot, voting is in writing; the votes are then counted and the result announced.

Most by-laws may be suspended by a vote of the members, and the constitution may be amended according to provisions for amending it contained in the by-laws.

For a thorough understanding of all points of parliamentary law, a special manual should be obtained. One of the best is *Robert's Rules of Order* (compiled by Henry Martyn Robert).

PARNAS'SUS. A beautiful mountain in Greece, once revered as sacred, was called Parnassus. Now known as Likeri, the mountain has twin peaks about 8,000 feet above sea level. To the ancients it was sacred to Apollo, the Muses, Dionysus, and Pan, who held forth on its snow-capped peaks. On one of the slopes was Delphi, seat of the celebrated oracle; still to be seen on the mountain is the Castalian spring, whose water was thought to be an inspiration to poets.

PAR'NELL, CHARLES STEWART (1846-1891). Among the names of Ireland's great fighters for Home Rule, that of Charles Stewart Parnell ranks among the highest. A native of Avondale, Ireland, he attended Cambridge University and was elected to Parliament in 1875. In 1880 he became the leader of the Irish faction in Parliament, where he led the fight for Home Rule so vigorously that he was sent to prison for six months.

Victory for Home Rule seemed at hand when Gladstone introduced his bill of 1886, but the government was defeated, and a year later Parnell was charged with conspiring against the government. He was acquitted, along with other members of the party, but a scandal involving his name shortly afterward deprived him of his influence among his party members. See IRELAND.

PAR'AKEET, *par'oh ket.* Noted for their brilliant plumage, parakeets are among the smaller members of the parrot group. In general, parakeets inhabit the warmer regions of the earth, particularly Australia, Africa, and the East Indies. All except the affectionate little love birds of Africa have long, colorful tail plumage. The *ground* parakeet of Australia and Tasmania is terrestrial in its habits, making only short, occasional flights.

One of the most beautiful species is the *ring* parakeet of Ceylon, a pigeon-sized bird of green plumage, with a neck ringed with red. A similar species, the *rose* parakeet, may be identified by the male's black-edged, rose-colored collar. The only species native to the United States is the *Carolina* parakeet, a bird of brilliant green, yellow, and orange plumage. Parakeets are popular cage birds. See PARROT.

PAR'ROT. In North America we think of the parrot as a bright-colored cage bird that can be trained to talk. It is a surprise to know that somewhat over a hundred years ago a small native parrot, the *Carolina parakeet* (See PARAKEET), was abundant in Eastern United States.

Parrots form a large group of birds divided into a number of families and known by various names, such as *nestor, lory, cockatoo, macaw, parakeet* (or *paroquet*), etc. Most of them are tropical birds of bright colors, presenting reds, greens, blues, and yellows in striking combinations. All have very heavy, curved bills with naked skin on the base above, and they possess thick, fleshy tongues. The feet have four toes, two in front and two behind.

Parrots are climbing birds and use their

THESE BIRDS HAVE ABLE BILLS

Parrots are remarkable in possessing very strong hooked bills which are hinged at the top and are highly efficient. The crested fellow above can crack hard palm nuts quite handily with his powerful pincers. Right, two South Americans talk it over.

bills as well as their feet, in moving about. Their food is composed of vegetable matter almost entirely—seeds, buds, flowers, leaves, fruit, and the like. Parrots live in flocks, although each pair is said to mate for life. They nest in holes in trees or in banks of earth, and lay from two to eight white eggs. They live to be very old.

PARSEES, *pahr′seez,* **or PAR′SIS.** The only modern followers of the faith of the ancient Persian philosopher Zoroaster are the Parsees, a highly respected, well-educated group of merchants living in India. The word *Parsees* is a corruption of *Persian*.

The religion of the Parsees prescribes the worship of earth, air, water, and, most important, fire. The most unusual practice is the method of disposing of the dead by permitting the bodies to be eaten by vultures in order not to defile any of the four sacred elements (see Towers of Silence).

The group of about 100,000 Parsees in India is extremely exclusive, and most of the members are wealthy. They never marry into other races or intermingle beyond necessity, but their efficiency and reliability as merchants have won the admiration and favor of Europeans.

PAR′SLEY. The little sprigs of greenery which brighten dinner plates the world over are leaves of parsley. Originally grown in Mediterranean countries, the plant is now known nearly everywhere, chiefly as a decoration and seasoning.

PAR′SNIP. A familiar plant of the parsley family, the parsnip is grown in gardens for its edible, nutritious roots. The parsnip is one of our most useful winter vegetables. The roots can be kept through the cold months whether stored in a cellar or left in the ground to freeze, and with their sweet, agreeable flavor they help to break the monotony of the somewhat heavy meals of winter time. Though used chiefly as a table vegetable, parsnips are wholesome food for stock. In Europe they are especially valued as cattle feed.

Courtesy Thos. Cook & Son

PERICLEAN CLIMAX

Athenians of the Golden Age set an architectural standard in the Parthenon that modern builders have yet to achieve.

PAR'THENON. Atop the Acropolis of the city of Athens stand the remnants of the finest building ever erected. It is the Parthenon, the glorious marble temple erected during the Golden Age of Greece and dedicated to the goddess Athena.

This building, the culmination of the marvelous beauty and restraint of the Greeks, is of the Doric order, and is 228 feet long and 101 feet wide. Before it was damaged, it had eight splendidly proportioned columns at each end and seventeen on either side, supporting a frieze surrounding the building. On this frieze were colored relief figures telling stories of the Greek festivals, the legendary life of Athena, and the history of Greece. The two pediments were decorated with round sculpture. Two rooms comprised the interior, one containing a gold and ivory statue of Athena by Phidias.

One of the reasons the Parthenon is considered such a perfect building is that every optical impression was accounted for to form a unified structure. The columns tapered slightly at the top to give the appearance of graceful strength; all the lines were slightly curved to give the building a solid, unified appearance; and every block of marble was fitted accurately and artistically.

The Parthenon served as a church and a mosque in the Middle Ages, finally being damaged by an explosion of gun powder stored in it by the Turks in 1687. It is, however, slowly being restored. See ACROPOLIS; ELGIN MARBLES.

PARTICIPLE, *pahr'ti sip'l.* A verbal, or form of the verb, which may also be used as an adjective or a noun (gerund) is called a participle. It has three tenses—present, past, and perfect—all of which may be used in either the active or passive voice of transitive verbs. The participial forms of the verb *to part* are:

	Active	*Passive*
Present	parting	being parted
Past	parted	parted
Perfect	having parted	having been parted

The participial forms of the intransitive verb *to be* are *being, been,* and *having been.*

When used as a verb, a participle may be modified by an adverb, may take an object, or may take a complement. It may likewise be used as an adjective to modify another word, or as a noun serving as a subject or object, or complement.

Examples:

(a) *Running* is a form of exercise.

(b) They caught the thief *running* away.

In sentence (a) above, *running* is a verb form used as the subject, and so it becomes a noun. In sentence (b), *running* modifies *thief,* and so it serves as an adjective. Sometimes participles ending in *ing* and serving as nouns are known as gerunds to distinguish them from participial forms serving only as adjectives.

PART'NERSHIP. In the promotion of a business, two or more persons may form an association recognized as a partnership. This organization is usually based on an agreement that those who are partners shall share the gains of the business and also make good its losses.

The relation of partners to each other should be expressed in a written contract, each member thereto retaining a copy of it; some partnerships are effected by verbal agreement, but a mere verbal understanding gives rise to dangers of litigation.

When a partnership is dissolved, debts must be paid first. After they have been paid, the remaining assets are distributed; if the total assets are insufficient to meet debts, then the private funds of the partners must be drawn upon. See CORPORATIONS.

PART'RIDGE. Various game birds of the partridge and grouse family are popularly called partridge, but strictly speaking there are no native American partridges. The original genus is native to the Old World. European partridges (Hungarian) have been introduced into Canada and the United States. See GROUSE; QUAIL.

PASCAL, *pas kahl',* BLAISE (1623-1662). The discoverer of a basic physical law and one of France's greatest philosophers, Pascal was born in Clermont, in Auvergne. He received the finest scientific education then available, becoming especially interested in mathematics. In 1654 he joined a monastic sect and thereafter divided his time between science and religion. His brilliant writings include his *Apology for the Christian Religion.*

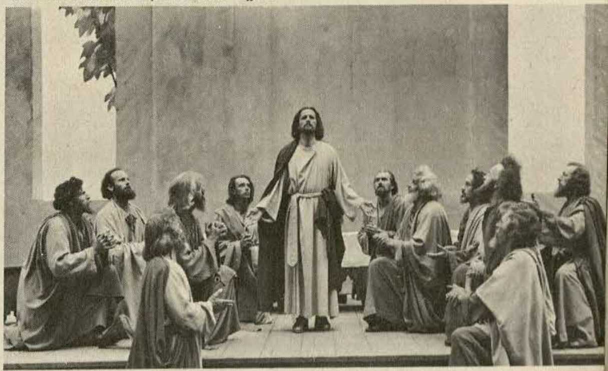
The law he discovered is stated thus: Pressure exerted anywhere upon the surface of a liquid enclosed in a vessel is transmitted undiminished in all directions, and acts with equal force upon all equal surfaces, and at right angles to the surfaces.

PASSENGER PIGEON. See PIGEON.

PASSION, *pash'un,* **FLOWER.** Spanish missionaries to the warmer parts of the American continents gave the passion flower its name because the parts suggested to them the suffering of Jesus. Three lobes of the pistil were thought to represent the three nails that were driven into Christ upon the cross, one through each hand and one through both feet. Below are five stamens, which may represent the wounds in hands, feet, and side. The stamens and pistil are borne upon a column which may be compared to the one to which Jesus was tied when He was scourged. There are three rows of almost needle-like parts in the center of the flower, suggesting the crown of thorns. The leaves of some species are three-parted and are said to represent the Trinity.

Passion flowers belong to a family containing sixteen genera and over 300 species. They are mostly vines, but may be trees, shrubs, or herbs. The large, handsome flowers are red, white, or pink; the fruits are orange-colored, and are known as *maypops.*

German Tourist Information Office

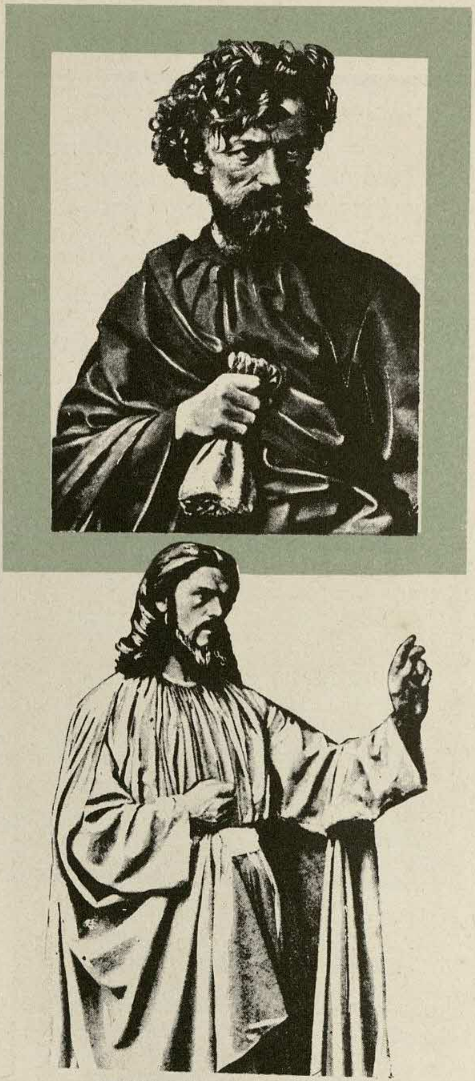


A VILLAGE OF BIBLICAL ACTORS

Nearly every citizen of Oberammergau takes part in the famous Passion Play. Here Jesus, portrayed by a reverent townsman, prays with His disciples at the Last Supper.

PASSION PLAY. Once every ten years the peaceful citizens of Oberammergau, Bavaria, perform the most famous of all religious dramas—the Passion Play. The play is a re-enactment of the passion and crucifixion of Jesus, and it has been given regularly since the seventeenth century. In 1633 the villagers were so grateful for having been spared the ravages of a plague then in progress that they vowed to present the drama every tenth year.

The parts are played with a profound and moving reverence born of the simplic-



SAVIOUR AND SINNER
The Bavarian villagers who enact the Passion Play at Oberammergau actually look their parts Below, the Christus. Top, Judas.

ity and goodness of the villagers, more than 600 of whom take part. Thousands of visitors gather in the tiny Alpine town for each performance.

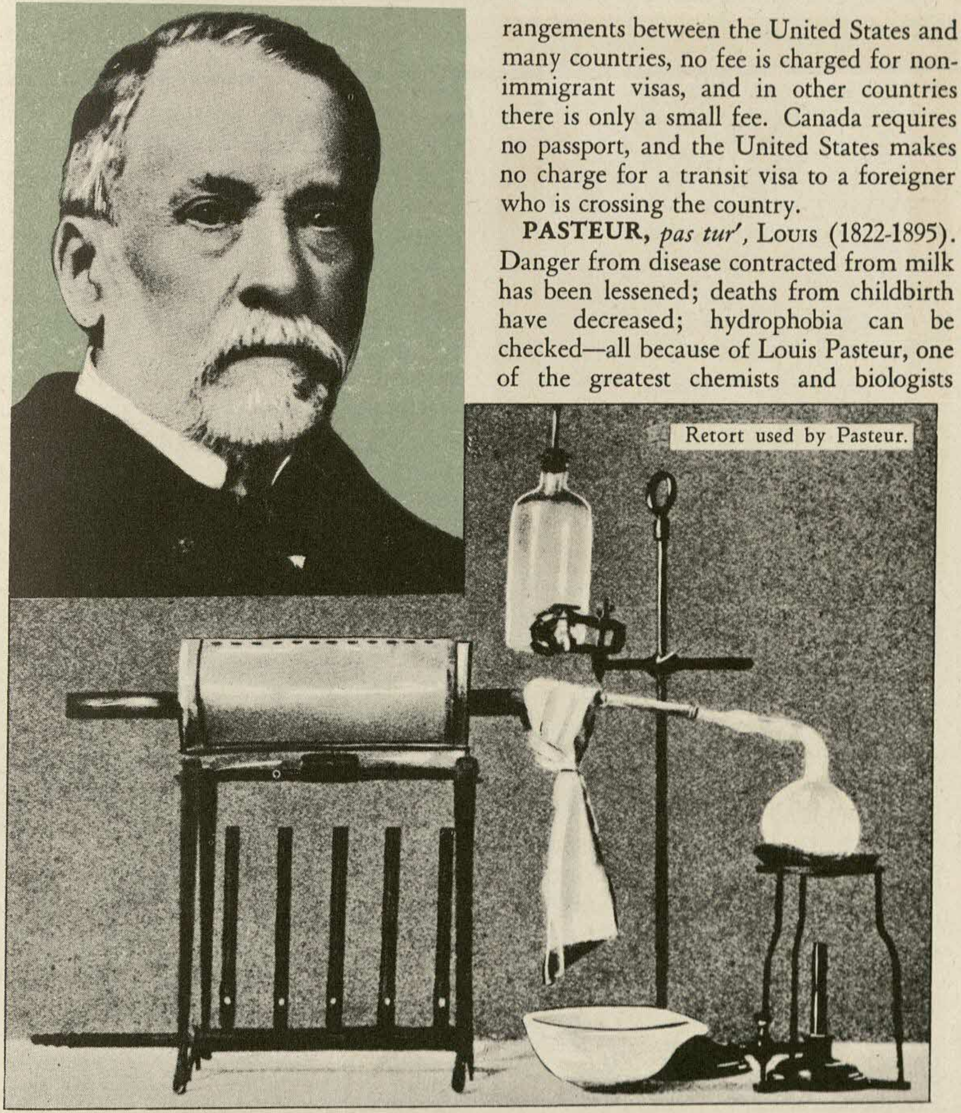
PASS'OVER. A celebration of the deliverance of the Israelites from Egyptian bondage, the Feast of Passover is observed each spring by Jews the world over. It receives its name from the Biblical passage describing how God brought death to the first-born of the Egyptian families, but *passed over* the Hebrews. The observance begins on the night of the first new moon of spring and lasts eight days.

On the first night a feast is held in the home at which special foods are eaten, symbolizing the happiness and sorrows of the ancient Jews. The father of the house reads the story of the deliverance. During the period of observance, unleavened bread is eaten in remembrance of the bread of the ancient Jews.

PASS'PORT. A passport is an official document issued by national authority, which gives the holder liberty to travel within or to leave the country in which he is a citizen, and permission to enter another country. It serves for identification and as a source of information upon which a foreign government may base its consent (in the form of a visa) for the traveler to enter its territory.

In the United States the issuing of passports is under the jurisdiction of the Department of State. An American needs no passport to travel within the United States, but if he intends to travel abroad, he must make application for one at the Department of State or one of its agencies, through the clerk of a Federal court, or through the clerk of a state court which has authority to naturalize aliens. If American-born, he must accompany his application with a birth certificate or other satisfactory proof of age. If the applicant is a naturalized citizen, his naturalization papers must be presented for inspection.

Two unmounted photographs, recently taken and between two and a half and three inches square, must also accompany the application, which must bear a signed affidavit of a witness who has known the applicant for at least two years. A witness who is an American citizen must appear with the applicant for identification. A fee of $9 is charged for the passport, and $1 for execution of the application. The passport is good for two years unless otherwise limited, but for a fee of $5 it may be renewed for two years.


Retort used by Pasteur.

HE WARRED ON GERM DISEASES

The great French chemist, Louis Pasteur, made social and economic contributions of first importance in his study of micro-organisms.

American consulates abroad have authority to issue passports, with certain exceptions. In dependencies of the United States, applications for passports should be filed with the office of the highest executive officer.

Every country fixes its own fees for visaing a passport, that is, approving the entry of the holder. However, by reciprocal arrangements between the United States and many countries, no fee is charged for nonimmigrant visas, and in other countries there is only a small fee. Canada requires no passport, and the United States makes no charge for a transit visa to a foreigner who is crossing the country.

PASTEUR, *pas tur',* Louis (1822-1895). Danger from disease contracted from milk has been lessened; deaths from childbirth have decreased; hydrophobia can be checked—all because of Louis Pasteur, one of the greatest chemists and biologists France ever produced. Through his fundamental work in biology, he laid the ground work for the conquest of germ diseases.

Pasteur was born in the village of Dôle. He attended the Royal College of Besançon and, later, the Ecole Normale, in Paris. Becoming professor of chemistry at the Sorbonne in 1867, he conducted many experiments which brought criticism from his colleagues; yet the theories he advanced were finally accepted, and he won membership in the French Academy. When the Pasteur Institute was opened, in 1888, he became its director, and remained there until death interrupted his labor for humanity.

Pasteur invented the standard method of sterilizing milk, or *pasteurization* (see MILK). Through experiments on dogs, he found a means of preventing hydrophobia. This process, the Pasteur treatment, is the inoculation of a virus which combats the virus of the disease. In addition, he developed treatments for anthrax and animal cholera among cattle and sheep. Pasteur's other accomplishments include successful experiments with diseases of silkworms and the study of diseases affecting wine and beer. By these investigations he made a very valuable contribution to the silk and liquor industries of France. See BACTERIA AND BACTERIOLOGY.

PATAGO'NIA. A name commonly applied to the extreme southern part of South America lying from about latitude 38° south to the Strait of Magellan, Patagonia was discovered by Magellan in 1520. Since 1881 it has been divided between Argentina and Chile. Magallanes, formerly called Punta Arenas, is the southernmost city in the world and is located near the southern tip of the Chilean portion.

PAT'ENT. Issued under the seal of the government, a patent is a written instrument granting to an inventor exclusive property rights in his invention for a period of years.

United States Patents. Protection to inventors (and authors), which has been the foundation of America's copyright and patent laws, is provided in the Federal Constitution.

A patent may be obtained by any person who has invented or discovered any new and useful art, manufacture, or composition of matter, or any improvement on any existing patent, not heretofore known or used. In the United States it must be such a device as has not even been described in print and never patented in any country.

Applications for patents are made to the Commissioner of Patents in the Patent Office, in the Department of Commerce at Washington. Accompanying the application there must be a written, detailed description of the device, the manner and process of making, or compounding, and using it; in case of an improvement on an existing patent, the specifications must point out the parts to which the improvement relates, making clear what is old and what is new. Descriptions must also be accompanied by drawings. The patent right runs for a period of seventeen years. All rights expire at the end of this period. For a statement of fees and costs involved in making application, the inventor should write to the Patent Office for its booklet of general information.

Citizens of any country can patent inventions in other countries. Patents merely give the inventor the right to sue in case of infringement; they do not automatically protect against infringement, and if an inventor cannot afford the litigation of an infringement suit, he has no power to prevent others from benefiting by his invention.

PATRICIAN, *pa trish'an.* Members of the upper ranks of society in ancient Rome were called patricians, a name derived from the Latin word *pater,* meaning *father.* Their ancestors were Romans; and this fact distinguished them from the plebeians, whose forefathers were conquered peoples brought to Rome. See PLEBEIANS.

PAT'RICK, SAINT (about 389-461). The man who became the patron saint of Ireland was Saint Patrick, a half-legendary figure whose memory is celebrated on March 17. It is thought that he was born in either England or Scotland and that he was captured and taken to Ireland at the age of sixteen. In France he studied for the ministry and returned to Ireland in 432. In his efforts to abolish paganism, he is said to have founded 300 churches and to have baptized thousands of converts. His autobiography, *Confession,* deals more with his work than with an account of his life. Perhaps the best-known legend about him is the tale that he drove the snakes out of Ireland single-handed.

PATROON′ SYSTEM. The patroon system was a plan used by the Dutch West India Company in colonizing New York state, then called New Netherland. It provided that any member of the company could obtain a tract of land extending sixteen miles along the coast or one bank of a river, or eight miles along both banks of a river, if he would establish, within four years, a colony of fifty people. The system was harmful in that the proprietor, or patroon, soon came to resemble a feudal lord in power. The system eventually disappeared, the last of the estates being sold about the year 1850.

DEVOUT APOSTLE

Saint Paul, as characterized by artist Raphael.

PAUL, SAINT. The first great missionary of Jesus and the most influential interpreter of His philosophy was Paul, born Saul of Tarsus, of a prominent Hebrew family.

Early in his career, after receiving the best education available, Paul was commissioned to persecute the Christian believers. But while he was on his way to Damascus for this purpose, he had a vision of Jesus and was converted to Christianity. Immediately he began the Christian preaching and writing which won him his undisputed position in Church history. He did perhaps more for the spread of Christianity than did any other man. He has become known as "the Apostle of the Gentiles."

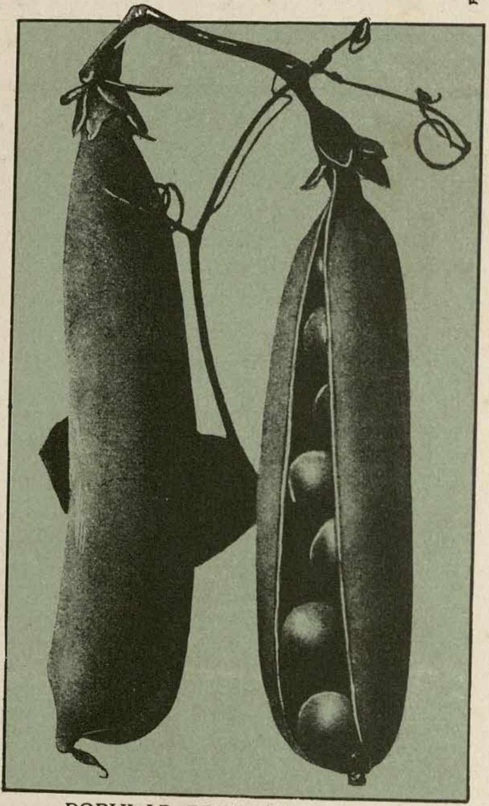
In all, Paul went on three missionary journeys. The first (A. D. 46) took him to Asia Minor with Barnabas. Five years later he went again to the same region, as well as to several of the Greek cities near by. The third trip took him to Ephesus (about A. D. 54), and from there he went to Jerusalem, all the while preaching to the ever-growing group of Christians.

Paul's zeal in preaching Christianity and his progress finally caused the Roman governor to imprison him, but Paul made use of his right as a Roman citizen and demanded an appeal to the emperor. So he was sent to Rome, where he spent two more years in prison. What the emperor did is not known, but tradition has it that the great preacher was martyred.

Saint Paul's treatises on Christianity are literary masterpieces and unexcelled as philosophical thinking. They include several books of the Bible: *First* and *Second Thessalonians, Galatians, First* and *Second Corinthians, Romans, Colossians, Philemon, Ephesians, Philippians, Titus,* and *First* and *Second Timothy.*

PAVE′MENT. See ROADS AND STREETS.

PAWNEE′. The first farmers of Nebraska were the Pawnee Indians, who now live on a reservation in Oklahoma. These Indians built houses of earth and logs along the Platte River. They wore their hair in the shape of a horn, which, in Indian language, accounted for their name. They



POPULAR PROTEIN PELLETS
Fresh green peas, prized product of the garden.

ceded their holdings to the United States government in the latter part of the nineteenth century.

PEA. Row upon row of the crisp, green foliage of the pea plant line kitchen gardens almost everywhere. The pea, a legume native to Southeastern Europe and Southwestern Asia, is one of the commonest of garden vegetables and also is commercially important. Certain types of peas are extensively grown as stock food and hay; others are cultivated for their gorgeous blossoms. Like other legumes, peas are valuable as a source of protein.

The plant, which grows either as vine or dwarf, produces small white blossoms which are followed by the long, fat pods containing the peas. There are two general types of pea, the smooth and the wrinkled, the latter being superior for eating. Peas cultivated in home gardens are usually gathered by hand, but those raised commercially are picked, shelled, and sorted by machinery. The pea is a hardy plant and thrives best in a cool climate; hence most of the crop in the United States is raised in the North.

PEACE CONFERENCE, INTERNATIONAL. In 1899 and again in 1907, the leading nations of the world gathered at The Hague to discuss world peace and to codify international law. The first Peace Conference was called by Czar Nicholas II of Russia, and twenty-six nations responded.

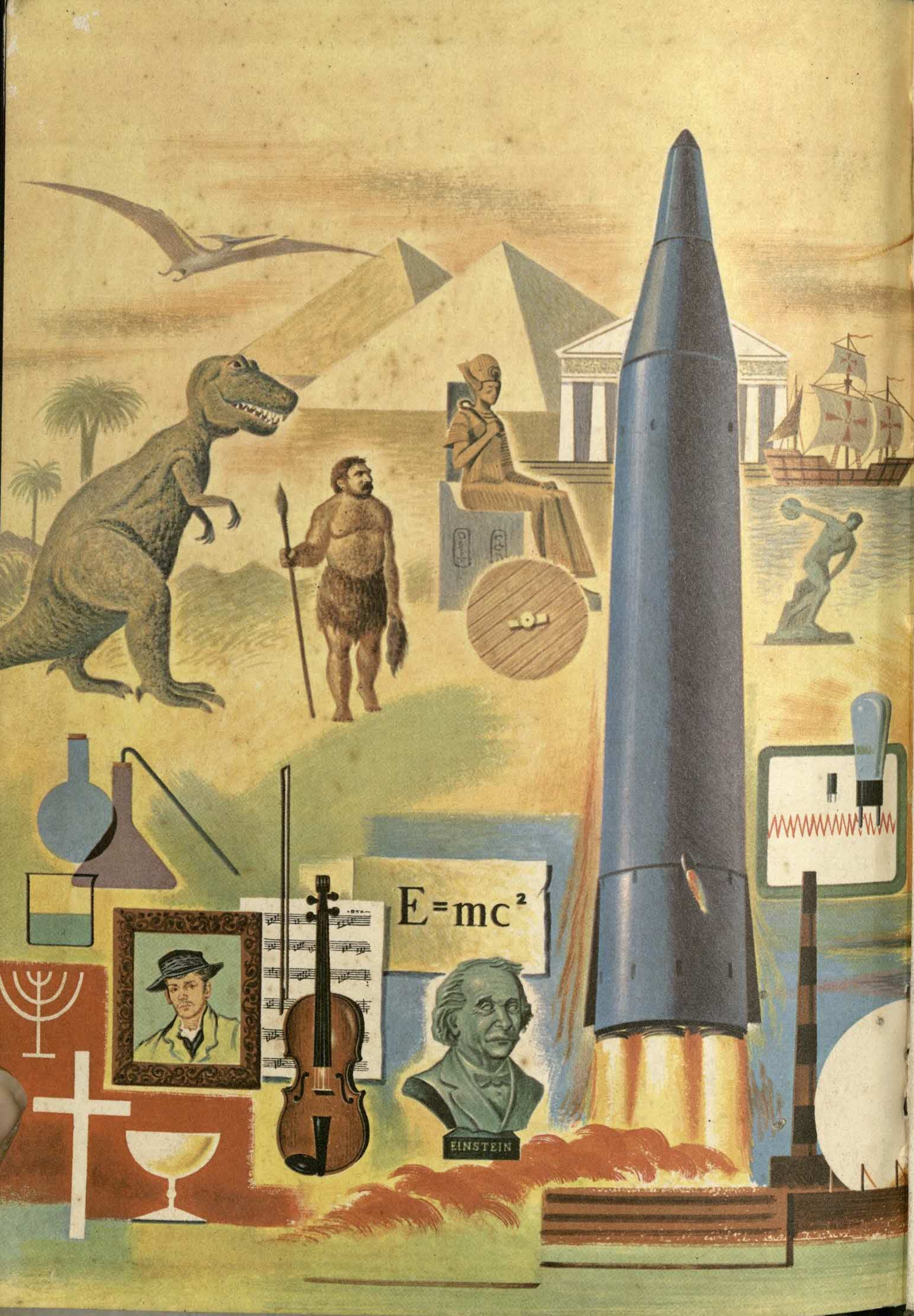
Three major questions were considered —disarmament, more humane methods of warfare, and arbitration. The several nations declared themselves in favor of reducing armaments; they outlawed the use of balloons for dropping explosives, deadly gases, and bullets devised for torturing victims. The United States and Great Britain, however, did not ratify all these provisions. Other agreements, or conventions, applied the humane provisions embodied in the former Geneva Convention to naval warfare and provided a more detailed code of rules for war (see INTERNATIONAL LAW).

Arbitration was made an international duty and a Permanent Court of International Arbitration was established and housed at The Hague (see HAGUE, THE). This court, long an influence in the peaceful arbitration of disputes, was largely superseded first by the Court of International Justice (World Court) established under the League of Nations, and later by the Court of Justice, the judicial organ of the United Nations.

In 1907 a second conference was called, and forty-four nations responded. Thirteen conventions were adopted to strengthen international arbitration and further the movement for humane warfare.

Under stress of actual warfare, most of these laudable conventions were violated. However, forward-looking statesmen hope that some day all nations will observe the principles laid down at the Hague Conferences. See NATIONS, LEAGUE OF; PERMANENT COURT OF INTERNATIONAL JUSTICE.

[illegible]


E=mc²
EINSTEIN

571
571